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VIA EMAIL

September 15, 2005

Ann Mazzullo
Office of Exemptions
U.S. Department of Transportation
400 7th Street SW
Washington, D.C. 20590

RE: Application for Exemption

Dear Ann:

BP Amoco Chemicals (BP), of Pasadena, Texas is applying for a DOT exemption for the shipment of heat exchangers under the regulations present in 49CFR107.105. These heat exchangers will be shipped one-way from the BP facility in Pasadena to Dunn Heat Exchangers of Texas City Texas for metals reclamation.

Included with this electronic submission are the following documents:

1. Required Information for Requesting an Exemption Under 49CFR Subpart B – Exemptions (7 pages),
2. Material Safety Data Sheets for the compounds of interest (9 compounds)
3. DOT training course descriptions from the transporter
4. Description of the motor vehicle to be used in transportation

I have attempted to organize the requested information in a way that facilitates your review of the application. I think you will like it, even if it seems a bit verbose.

If you find issues in the application that require additional information or clarification, please do not hesitate to contact me. I will be acting as agent for BP Amoco in this application and I will attempt to address your concerns promptly.

I am sending a hard-copy version of this application so that you will have a back-up should anything happen to the digital files. I know this is probably overkill but BP was firm on this point.

Also, when you receive the digital files, would you send me an email confirming receipt?

Sincerely,

Bruce Handley

Bruce Handley, P.G.

In file

14255 BPAM

BP - Pasadena DOT Exemption Application

Required Information for Requesting an Exemption under 49 CFR Subpart B- Exemptions

Each application for an exemption or modification of an exemption must--

1. Be submitted in duplicate and, for timely consideration, at least 120 days before the requested effective date to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Admin., U.S. Department of Transportation, 400 7th Street, SW., Washington, D.C. 20590-0001, Attention: DHM-31.

The requested information was submitted via email, at the request of Ann Mazzullo, DOT Technical Specialist, on September 15, 2005. This date is 127 days from the requested effective date of January 20, 2006.

2. State the name, street, mailing address, telephone number of the applicant; or an individual designated as an agent of the applicant.

Applicant:
BP Amoco Chemical Company
1500 North South Street
P.O. Box 2016
Pasadena, Texas 77501-2016

Agent of the Applicant:
Bruce Handley
The Benham Companies LLC
9800 Richmond Avenue, Suite 590
Houston, Texas 77042-4634
Work: 832.252.1144
Mobile: 713.703.7244

3. If the applicant is not a resident of the United States, the applicant must designate an agent for service in accordance with 49 CFR 107.7.

The applicant is a U.S. corporation.

4. For a manufacturing exemption, one must provide a statement of the name and street address of each facility where manufacturing under the exemption will occur.

This application is for a non-manufacturing exemption.

5. If confidential treatment is requested, the applicant must comply with 49 CFR107.5(a).

Confidential treatment is not requested.

6. State the citation(s) of the specific regulation from which relief is sought.

Relief is sought from 49 CFR § 173.240 in that a non-DOT specification pressure vessel (Stainless steel and/or carbon steel heat exchanger) is not authorized for transportation. Relief is also sought from 49 CFR § 172.302 (c) pertaining to marking requirements.

7. Specify the proposed mode or modes of transportation.

Specialized motor vehicle owned and operated by Dunn Heat Exchangers, Texas City, Texas, the destination facility. See attached photograph of the transporting vehicle type. Each vehicle has a steel-containment pan and ribbed tarp cover to protect exchangers from rainfall.

8. Provide a detailed description of the proposed exemption (e.g., alternative packaging, test, procedure or activity) including, as appropriate, written descriptions, drawings, flowcharts, plans and other supporting documents.

The proposed exemption is generally similar to that granted to KRATON Polymers U.S. LLC under exemption DOT-E 12855 expiring on November 30, 2005. This application, if granted, would authorize one-way transportation of non-DOT specification pressure vessels (stainless steel, carbon steel, and brass heat exchangers) containing the residue of a Class III material by highway motor vehicle.

The main differences between the exemption applied for in this request and that granted in

DOT-E 12855 are the following:

1.) Point of shipment – This application is for heat exchangers originating in Pasadena, Texas.

2.) Type of exemption – The initial KRATON exemption was an emergency application for transportation of two (2) exchangers containing potentially hazardous materials for cleaning and return to service in Belpre, OH.
In contrast, this application is for the one-way shipment of approximately 118 purged and cleaned exchangers from Pasadena, Texas to Dunn Heat Exchangers of Texas City, Texas, for metals reclamation.
3.) The type of specific chemicals in service. BP will ship similar classes of compounds but the specific compounds differ between KRATON and this application.

Exemption 12855 contains detailed requirements for the grantee, specifically those included in sections 7 through 12. BP has reviewed all of these requirements and proposes to conduct the transportation of its heat exchangers in a manner that offers an equal or greater degree of safety through control measures.

9. Specify the proposed duration or schedule of events for which the exemption is sought.

The duration for which the exemption is sought is January 20, 2006 through December 31, 2006.

10. Provide a statement outlining the applicant's basis for seeking relief from compliance with the specified regulations and, if the exemption is requested for a fixed period, a description of how compliance will be achieved at the end of that period.

BP is decommissioning some of their assets in their Pasadena, Texas, facility. The removal of some chemical process equipment related to the formulation of Linear Alpha Olefins (LAOs) has resulted in the need to remove and reclaim the metal from the heat exchangers used in that process.

BP is seeking relief from compliance with the specified regulations since the materials of construction and packaging integrity of the heat exchangers provides a high degree of safety and are at least as protective as an authorized DOT container.

The exemption is requested for a fixed period from January 20, 2006 to December 31, 2006. BP does not anticipate decommissioning activities to extend past the expiration date, but should additional heat exchangers need to be sent off for metals reclamation after that date, BP will take appropriate steps to apply for an extension (revision) of the exemption in sufficient time to ensure compliance after December 31, 2006.

11. If an emergency exemption is requested, the applicant must comply with 49 CFR 107.117 and provide a statement of supporting facts and reasons.

Documentation of the year of hydrostatic test, service description, package design information, operating pressures and other pertinent information is presented in Table 1, Exchanger Summary.

15. The application must demonstrate that an exemption achieves a level of safety at least equal to that required by regulation, or if a required safety level does not exist, is consistent with the public interest. At a minimum the application must provide the following:
a. Information describing all relevant shipping and incident experience of which the applicant is aware that relates to the application.

The applicant (BP) is aware of the relevant shipping and incident experience for this exemption after making a detailed review of a previously granted exemption, DOT-E 12855 (Fifth Revision) expiring November 30 2005 granted to KRATON Polymers U.S. LLC of Belpre, OH.

Using the 12855 exemption as a guide, BP proposes the following Safety Control Measures and Operational Controls:

Safety Control Measures
A.) Packaging – Prescribed packaging are:

1.) Non-DOT "U" stamped pressure vessels (stainless steel) heat exchangers that are constructed in accordance with Section VIII Division I of the ASME Code, will have been successfully hydrostatically tested to no less than 50 psig. (The year of the hydrostatic test for each piece of equipment is present in Figure 1.)
2.) Non-DOT "U" stamped pressure vessels (carbon steel) heat exchangers that are constructed in accordance with Section VIII Division I of the ASME Code, will have been successfully hydrostatically tested to no less than 50 psig. (The year of the hydrostatic test for each piece of equipment is present in Figure 1.)
3.) Non-DOT "U" stamped pressure vessels (brass and copper-nickle) heat exchangers that are constructed in accordance with Section VIII Division I of the ASME Code, will have been successfully hydrostatically tested to no less than 50 psig. (The year of the hydrostatic test for each piece of equipment is present in Figure 1.)

Operational Controls

1.) Heat exchangers tubes/equipment that have internal spaces that may contain trapped residual materials will be purged with hydrocarbon and decontaminated to industry standards with water or steam before shipment according to Pasadena Chemicals internal safety policy # 5.2 (HazCom). This includes all hazardous and product service classes. All heat exchangers will be capped prior to shipment.
(Note: Since there is negligible opportunity for hazardous liquids to remain in the heat exchangers after BP's rigorous cleaning routine, we do not feel that shipping the exchangers under a positive nitrogen atmosphere adds to their safety during

transportation.)

2.) The Maintenance Foreman/Coordinator will ensure that each piece of equipment has a Hazardous Service Warning Tag attached. The Maintenance Foreman/Coordinator will consult with the appropriate Operations Foreman as necessary to determine the hazardous material(s) most recently contained by the equipment or part. This information will be included on the Hazardous Service Warning Tag.
3.) The Maintenance/Operations Foreman shall ensure that an MSDS for the material(s), as indicated on the Hazardous Service Warning tag, is forwarded with the shipping papers to the outside service company.
4.) Each heat exchanger will be transported via the specialized trucks owned and operated by Dunn Heat Exchangers of Texas City, Texas, the destination facility.
5.) Each pressure vessel must be secured to the motor vehicle in accordance with the requirements of §§393.100 through 393.106.

In addition to the Safety Control Measures and Operational Controls proposed above, BP will adhere to the provisions listed in the KRATON exemption as §8 through 12. In particular, BP will adhere to the provisions noted in §11 (Compliance) where DOT training is required for "HAZMAT employees". The motor vehicle operators employed by Dunn Heat Exchangers are subject to DOT training. The training taken by these operators, who will be responsible for loading, transportation, and unloading of the exchangers, is included with this application.

15b. A statement identifying any increased risk to safety or property that may result if the exemption is granted and a description of the measures to be taken to address that risk.

The applicant (BP) has not identified any increased risk to safety or property should this exemption be granted. The fact that the heat exchangers are thoroughly cleaned and will be transported by DOT-trained drivers experienced in the transportation of this equipment, serves to mitigate the very minimal risk that might be associated with this activity.

15c. Either substantiation, with applicable analyses, data or test results, that the proposed alternative will achieve a level of safety that is at least equal to that required by the regulation from which the exemption is sought; ***or***

See section 15d.

15d. If the regulations do not establish a level of safety, an analysis that identifies each hazard, potential failure mode and the probability of its occurrence, and how the risks associated with each hazard and failure mode are controlled for the duration of an activity or life-cycle of a packaging.

BP considers the regulations pertinent to the shipment of heat exchangers to be sufficient to establish a level of safety that is protective of human health and the environment. Due to the attention paid to cleaning of the exchangers prior to shipment and the experience and training of the drivers transporting this equipment, BP believes that the heat exchangers can be transported safely.

Perhaps the most severe failure mode would involve a motor vehicle accident where the heat exchanger was damaged. The probability of this occurrence is very low given the fact that commercial motor vehicle operators have accident rates on the order of 2.6 accidents per million miles driven (1994 data in September 1999 DOT TechBrief).

However, the slight risk of this occurrence is mitigated by the fact that the exchangers are thoroughly cleaned prior to shipment, that the drivers are DOT-trained and specialize in transporting this type of equipment, and that a motor vehicle accident would likely not damage the heat exchanger.

Table 1

HEAT EXCHANGER SUMMARY

YR/Hyd. Test	Equip #	Service Description	Size	Tube #	Tube Size (in.)	Metal	Head Type	Des Temp - Shell/Tube (psig)	Passes	Shell MAWP (psig)	Tube MAWP (psig)	Service (TS)	Service (SS)
1985	**E-310A**	Ethylene Cleanup Column Feed Cooler	180x12	107	0.75	SB-111	Fixed	150/300	3	150	450	Ethylene	Ethylene
1985	**E-310B**	Ethylene Cleanup Column Feed Cooler	180x12	107	0.75	SB-111	Fixed	150/300	3	150	450	Ethylene	Ethylene
1970	**E-311**	2nd Polymer Still Heater	192X14	80	0.75	SA-179	Fixed	150/100	2	450	250	MeCl	Ethylene
1995	**E-312**	Ethylene Cleanup Column Reboiler	96X12	61	1	SA-83	Fixed	575/410	1	150	435	Ethylene	Steam
1983	**E-313**	Ethylene Cleanup Column Feed Overhead Exchanger	260x18	238	0.75	SA-179	Fixed	150/150	2	450	450	Ethylene	Ethylene
1980	**E-315**	C-451 Bottoms Cooler	235x16	36	1	SA-179	Fixed	450/225	2	300	150	Olefins	Water
2004	**E-402**	2nd Light Olefin Column Preheater	275x18	348	0.625	SA-214	Fixed	400/400	1	250	150	Olefins	Steam
1970	**E-409**	Light Olefin Condenser	201x36	446	0.75	ADM. Brass	Fixed	135/100	1	50	150	Olefins	Steam
1981	**E-4108**	LOF Steam Preheater	248x24	433	0.75	SA-249	Fixed	650/650	1	300	300	Olefins	Water
2002	**E-410A**	Light Olefin Reflux Drum Condenser	192x46	910	1	SB-111	Fixed	300/160	4	50	150	Light Olefin	Water
2002	**E-410B**	Light Olefin Reflux Drum Condenser	192x46	910	1	SB-111	Fixed	300/160	4	50	150	Light Olefin	Water
1993	**E-411**	Heavy Olefin Column Reboiler	96x38	716	1	SA-179	Fixed	650/600	1	150	50	Heavy Olefin	DTA
2002	**E-4124**	Ethylene Preheater	354x39	1341	0.75	SA-214	Fixed	650/650	1	320	352	Ethylene	Steam
2002	**E-4125**	Ethylene Preheater	354x38	1341	0.75	SA-214	Fixed	650/650	1	320	352	Ethylene	Steam
1986	**E-412C**	Heavy Olefin Column Condenser	240x42	474	0.75	SA-210	Floating	600/500	2	50	150	Heavy Olefin	DTA
2004	**E-414**	Heavy Olefin Column Condenser	72x12.75	24	0.75	SB-111	Fixed	290/160	6	70	150	Water	Olefins
2002	**E-4173**	VP-4173 Service Fluid Cooler	142.6x8.6	32	0.75	SA-214	Floating	150/250	4	150	150	Olefins	Water
1994	**E-417A**	Light Olefin Reflux Condenser	192x42	296	1	SB-111	Fixed	360/160	4	50	150	Water	Olefins
2004	**E-419**	Heavy Olefin Purge Cooler	186x12.75	98	0.75	SB-111	Floating	350/350	2	700	150	Heavy Olefin	Water
2000	**E-4201**	C-4208 Reflux Condenser	276x24	204	0.75	SA214	Fixed	100	2	800	100	MeCl	Ethylene
1979	**E-4202A**	C-4201 Reboiler	151x22	229	1	SA-214	Fixed	700/700	1	150	500	Olefins	DTA
1970	**E-4202B**	C-4404 Reboiler	151x22	229	1	SA-214	Fixed	700/700	1	150	500	Olefins	DTA
1997	**E-4202C**	C-4404 Reboiler	96x21	229	1	SA-214	Fixed	700/700	1	150	500	Olefins	DTA
1993	**E-4206A**	K-4206 Bypass Cooler	8'x20"	42	0.75	SB-111	Fixed	300/300	1	150	150	Ethylene	Water
2010	**E-4207**	C-4208 Reflux Condenser	260x29	204	0.75	SA-334	Fixed	1041/707	2	800	550	MeCl	Ethylene

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2002	E-421	C-401 Condenser	192x42	600	0.75	SA-214	Fixed	400/400	2	50	150	Light Olefin	BFW
2002	E-4213	Cooler	130x13	113	0.75	SA-214	Fixed	350/350	1	250	250	Ethylene	Water
2000	E-4214	C-4201 OH Condenser	246x22	162	0.75	SA-214	Fixed	250/175	1	175	175	Water	Olefins
1993	E-4222A	C-4208 Reboiler	96x36	600	1	SA-214	Floating	700/700	1	250	500	Olefins	DTA
1981	E-4223A	C-4208 Feed Interchanger	287.5x28.5	575	0.75	SA-214	Fixed	150/150	1	500	500	Olefins/Ethylene	Olefins/Ethylene
1981	E-4223B	C-4208 Feed Interchanger	240x28	575	0.75	A-214	Fixed	150/150	1	500	500	Olefins/Ethylene	Olefins/Ethylene
2000	E-4225A	C-4208 Feed Cooler	272.75x25.75	536	0.75	SA-214	Fixed	150/300	2	150	500	Olefins/Ethylene	Water
2000	E-4225B	C-4208 Feed Cooler	272x13.75	536	0.75	SA-214	Fixed	150/300	2	150	500	Olefins/Ethylene	Water
2002	E-4226	Condenser	367.6x22	360	0.75	SA-214	Fixed	185/350	2	150	100	Olefins/Ethylene	Water
1992	E-4229	C-4208 Make-up C2 Chiller	300x23	119	0.75	SA-249	Fixed	250/200	4	1460	1800	Ethylene	Ethylene
1991	E-423	C-401B Feed Preheater	229x26	462	0.75	SA-214	Fixed	350/350	4	50	150	Olefins	Steam
2002	E-4250	Ethylene Cooler - OUT OF SERVICE	298x12.75	166	0.625	SA-179	Fixed	700/300	1	150	3400	Ethylene	Water
1995	E-4286	50 PSI Chiller	119..8x8.6	48	0.75	SA-179	Fixed	225/225	1	150	150	Olefins	MeCl
2002	E-429	Parafin Water Cooler	60x7.98	14	0.75	SA-214	Fixed	550/550	2	150	100	Water	Light Alcohol
2000	E-4290	K-4203B 1st Stage Intercooler	192x15	162	0.625	SA-214	Fixed	300/350	1	150	150	Ethylene	Water
1993	E-4291	K-4203B 2nd Stage Intercooler	192x15	162	0.625	SA-214	Fixed	300/350	"	200	200	"	"
1993	E-4292	K-4203B 1st Stage Intercooler	"	"	"	ADM. Brass	"	300	"	"	"	Ethylene	Water
1973	E-4293	K-4203B 2nd Stage Intercooler	"	135	"	SB-111	"	300	"	200	200	Ethylene	Water
1994	E-430	C-401B Side Draw Cooler	92x16	162	0.75	SA-179	Fixed	400/400	8	250	250	Light Olefin	Water
1987	E-4300	C-4208 Bottoms Heater	152x30	811	0.75	A-249304T	Fixed	500/500	1	300	50	Olefins	Steam
1970	E-4314	Brine Cooler	129x26	229	0.75	SA-214	Floating	400/200	12	50	150	MeCl	Olefins
1970	E-4315	Brine Condenser	89.5x22	162	0.75	SA-214	Floating	150/150	4	50	150	MeCl	Olefins
1986	E-4321	Vapor Cooler	134x35	770	0.75	A-214	Floating	400/185	8	50	150	MeCl	Olefins
1970	E-4322	Vapor Condenser	129x20	123	0.75	SA-214	Floating	150/150	2	50	150	MeCl	Olefins
2002	E-4323	C-4420 Bottoms Cooler	225x24	314	0.75	SB-111	Floating	400/175	6	100	150	Water	Olefins

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1995	**E-4331**	Cooler	223x16	140	0.75	304SS	Fixed	235/210	4	23	40	Water	Olefins
2002	**E-4332**	Heat Exchanger	287x32	706	0.75	SA-214	Fixed	400/400	4	150	150	Water	Olefins
1991	**E-434**	D-449 Pump Around Coller	141x21	300	0.75	SB-111	Floating	400/185	4	100	150	Water	Olefins
2000	**E-4341**	D-4342 Heater	222x16	150	0.75	SA-249	Floating	400/400	2	200	200	Olefins	Water
1981	**E-4400**	C-4201 OH Product Subcooler	96x17	208	0.75	SB-111	Fixed	300/300	1	150	150	Water	Olefins
2002	**E-4403**	C-4405 Reboiler	153x25	304	1	A-249	Fixed	400/400	1	200	200	Olefins	Water
1985	**E-4404**	C-4404 OH Condenser	222x27.75	280	0.75	SB-111	Fixed	400/175	8	150	150	Water	Olefins
2000	**E-4405**	C-4405 OH Partial Condenser	444x96	508	0.75	SB-111	Fixed	300/300	4	175	175	Olefins	Water
1976	**E-4406**	C-4406 OH Condenser	132x16	69	0.75	SB-111	Fixed	400/175	6	75	150	Water	Olefins
1995	**E-4409**	C-4405 LSS Condenser	251x12.75	35	0.75	SB-111	Fixed	300/300	8	200	175	Water	Olefins
1997	**E-441**	Heavy Olefin Column Bottoms Cooler	180x3	1	1.5	SA-181	Fixed	650/650	1	150	150	Water	Olefins
1979	**E-4410**	C-4411 Feed Preheater	204x18	180	0.75	SB-163	Fixed	700/700	4	300	300	Olefins	Water
1987	**E-4411A**	C-4411 Reboiler	159x34.25	563	1	SA-214	Fixed	700/500	1	250	150	Olefins	DTA
1983	**E-4414**	C-4411 Feed Preheater	220.5x14	77	1	SB-163-600	Fixed	700/700	1	250	250	Olefins	DTA
2000	**E-4415**	C-4411 OH Condenser	192x26	468	0.75	SB-111	Fixed	400/200	4	150	150	Water	Olefins
1990	**E-4416**	C-4403 Reboiler	180x28	345	1	SA-179	Floating	400/200	1	250	250	Olefins	DTA
2000	**E-4417**	C-4417 Condenser	330x24	188	0.75	SA-214	Fixed	650/650	2	250	250	Water	Olefins
2002	**E-4418**	C-4448 PA Cooler	238x12.75	116	0.75	SA-214	Fixed	400/400	1	150	150	Water	Olefins
1995	**E-4420**	C-4428 Reboiler	13'x2'	450	.0.75	C.S	Fixed	700	2	250	150	Olefins	DTA
1981	**E-4421**	C-4420 Reboiler	13'x34"	563	1"	SA-515-70	Fixed	700	2	250	150	Olefins	DTA
1995	**E-4422**	C-4420 Condenser	24'x26"	221	0.75	ADM. Brass	Fixed	400	2	225	225	Water	Olefins
2000	**E-4424**	C-4428 Condenser	23'x23"	225	0.75	C.S	Fixed	400	2	225	225	Water	Olefins
1987	**E-4427B**	C-4425 Reboiler	**15'x4'**	**955**	1"	C.S	Fixed	700	2	250	100	Olefins	DTA
2000	**E-4429**	C-4425 Condenser	31'x188"	62	0.75	ADM. Brass	Fixed	400	2	150	150	Water	Olefins
1976	**E-4430**	C-4430 Reboiler	13'x2'	280	1"	C.S	Fixed	700	2	250	75	Olefins	DTA

Table 1

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YR/Hyd. Test	Equip #	Service Description	Size	Tube #	Tube Size (in.)	Metal	Head Type	Des Temp - Shell/Tube (psig)	Passes	Shell MAWP (psig)	Tube MAWP (psig)	Service (TS)	Service (SS)
1980	**E-604B**	C-601 Feed/C-605 Bottoms Interchanger	184.7x15	88	0.75	SA-179	Fixed	353/469	2	150	600	Alcohol	Alcohol
2002	**E-605**	Light Alcohol Column Reboiler	96x38	716	1	SA-179	Fixed	650/600	1	150	50	Alcohol	DTA
1994	**E-606**	Light Alcohol Column Overhead Condenser	186x24	326	0.75	ADM. Brass	Fixed	341/155	1	30	155	Water	Alcohol
1988	**E-610**	Feed Heater	198x12	45	0.625	SA-179	Fixed	700/700	6	200	150	Olefins	DTA
2000	**E-614**	Interchanger	18'x13"	42	0.75	SA-106B	Fixed	600	2	535	444	Olefins	Olefins
1980	**E-615**	Product Cooler	16'x18"	50	0.075	SA-106B	Fixed	500	1	200	150	Water	Olefins
1964*	**E-704**	C8-C12 Alcohol Column Pumparound Cooler	212x12.75	50	1	SA-179	Fixed	275/150	1	75	100	Water	Alcohol
1979	**E-705**	C-702 Reboiler	147x16	92	1	SA-179	Fixed	650/500	1	250	120	Alcohol	DTA
1979	**E-705 S**	C8-C12 Alcohol Column Reboiler	147x16	92	1	SA-179	Fixed	650/500	1	250	120	Alcohol	DTA
1964*	**E-706**	C10 Alcohol Column Pumparound Cooler	226x16	106	1	SA-179	Fixed	270/150	1	75	100	Alcohol	Alcohol
1964*	**E-707**	C10 Alcohol Column Reboiler	96x38	716	1	SA-179	Fixed	650/600	1	150	50	Alcohol	DTA
1964	**E-709**	C12-C14 Alcohol Column Pumparound Cooler	226.5x18	139	1	SB-111	Fixed	305/150	1	75	100	Water	Alcohol
1964*	**E-711**	C12-C14 Alcohol Column Reboiler	171x37	715	1	SA-450	Fixed	650/600	1	150	30	Alcohol	DTA
1964*	**E-712**	C14-C16 Alcohol Column Pumparound Cooler	226x16	106	1	SB-111	Fixed	316/150	1	75	100	Alcohol	Alcohol
2002	**E-713A**	Spare Reboiler for C-705	96x28	378	1	SA-179	Fixed	630/615	1	150	40	Alcohol	DTA
1964*	**E-716**	C18 Alcohol Column Pumparound Cooler	224x12.75	62	1	SA-179	Fixed	430/150	1	75	100	Alcohol	Alcohol
1964*	**E-717**	C18 Alcohol Column Reboiler	167x28	378	1	SA-179	Fixed	630/615	1	150	40	Alcohol	DTA
1964*	**E-719**	C8-C12 Alcohol Column Feed/Bottoms Interchanger	239x3.5	1	1.9	SA-179	Fixed	250/400	1	75	75	Alcohol	Alcohol

Abbreviations:
MAWP = Maximum Allowable Working Pressure
TS = Tube Service
SS = Shell Service
ADM = Admiralty Brass
C.S. = Carbon Steel
DTA - Dowtherm(A)
MeCl = Methylene Chloride

Course Descriptions

Wednesday, November 03, 2004, 2:15 PM

Course Title = Hazardous Materials Transportation Act / Driver Training

Hazardous Materials Transportation Act / Driver Training

CFR Reference: 49 CFR 177.816(a)

Course Category: DOT

Written Exam: No

CEU's: 0.0

Retraining Required: 24 months

Description:

Unless this subchapter specifically provides that another person must perform a particular duty, each carrier, including a connecting carrier, must perform the duties specified and comply with all applicable requirements in this part and shall ensure its hazmat employees receive training in relation thereto.

No carrier may transport or cause to be transported, a hazardous material unless each hazmat employee who will operate a motor vehicle has been trained in the applicable requirements of 49 CFR 390 through 397 and the procedures necessary for the safe operation of the motor vehicle.

Elements:

A carrier may not transport hazardous material by motor vehicle unless each of its hazmat employees involved in that transportation is trained as required by this part and subpart H of part 172 of this subchapter. In addition, each hazmat driver must be trained in the applicable requirements of 49 CFR 390 through 397 and the safe operation of that motor vehicle.

Driver training shall include the following training:

Pre-trip safety inspection.

Use of vehicle controls and equipment, including operation of emergency equipment.

Operation of vehicle, including turning, backing, braking, parking, handling, and vehicle characteristics including those that affect vehicle stability, such as effects of braking and curves, effects of speed on vehicle control, dangers associated with maneuvering through curves, dangers associated with weather or road conditions that a driver may experience (e.g., blizzards, mountainous terrain, high winds), and high center of gravity.

Procedures for maneuvering tunnels, bridges, and railroad crossings.

Requirements pertaining to attendance of vehicles, parking, smoking, routing, and incident reporting.

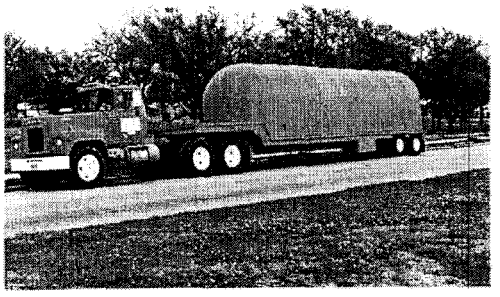
Loading and unloading of materials, including:

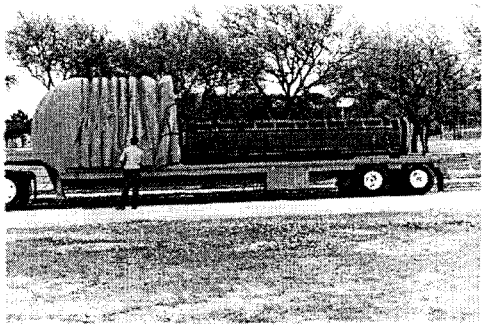
(a) Compatibility and segregation of cargo in a mixed load.

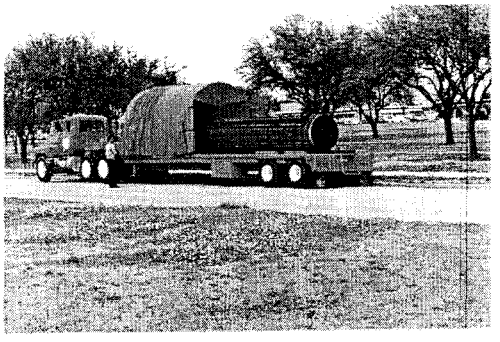
(b) Package handling methods.

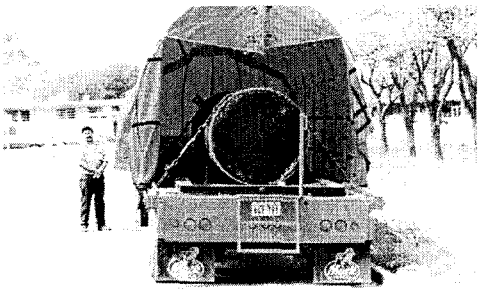
(c) Load securement.

While a written exam is not required, testing by appropriate means is required under Part 172.702(d).









FOR YOUR PROTECTION

Dunn Heat Exchangers, Inc.'s latest innovation protects against product exposure while transporting your exchanger to our shop.

This totally enclosed trailer assures the commodity and its product residual remains contained while in transit. Our trained personnel professionally handle the residuals within our system according to all current EPA regulations.

Opening and closing is accomplished simply by one control operated by the driver.

YOUR PROTECTION IS OUR CONCERN

Course Descriptions

Wednesday, November 03, 2004, 1:53 PM

Course Title = FMCSR/General Application

FMCSR/General Application

CFR Reference: 49 CFR 390.3(e)

Course Category: DOT

Written Exam: No

CEU's: 0.0

Retraining Required: 0 months

Description:

Every employer shall be knowledgeable of and comply with all regulations contained in this subchapter which are applicable to that motor carrier's operations.

Elements:

Every driver and employee shall be instructed regarding, and shall comply with, all applicable regulations contained in this subchapter.

Course Descriptions

Wednesday, November 03, 2004, 1:55 PM

Course Title = Hazard Communication (Right to Know) / Chemical Specific

Hazard Communication (Right to Know) / Chemical Specific

CFR Reference: 1910.1200 (h)

Course Category: OSHA

Written Exam: Yes

CEU's: 0.0

Retraining Required: 0 months

Description:

Employers must provide information and training to their employees about the hazardous chemicals to which they are exposed. Information and training may be designed to cover hazard categories or specific chemicals. Chemical -specific information must always be available through labels and material safety data sheets.

Elements:

Training will include:

Location of material safety data sheet (MSDS) book in the department.

The proper storage and dispensing procedures used.

Identify and explain hazards associated with the chemicals in the department.

The required personal protective equipment used.

The proper first-aid procedures to use in case of contact with chemicals.

How to properly label portable containers.

Identify the location of and how to use eye wash stations.

Who to contact and what to do in an emergency situation.

Course Descriptions

Wednesday, November 03, 2004, 1:56 PM

Course Title = Hazard Communication (Right to Know) / Employee Overview

Hazard Communication (Right to Know) / Employee Overview

CFR Reference: 1910.1200 (h)

Course Category: OSHA

Written Exam: Yes

CEU's: 0.0

Retraining Required: 0 months

Description:

Employers must provide information and training to their employees about the hazardous chemicals to which they are exposed. Information and training may be designed to cover hazard categories or specific chemicals. Chemical-specific information must always be available through labels and material safety data sheets.

In general, OSHA expects employees to know that they are exposed to hazardous chemicals, how to read and use labels and material data sheets, and that as a consequence of learning this information, they are following the appropriate protective measures established by the employer.

Elements:

Employees must be informed of/trained on:

Operations in their work area where hazardous chemicals are present.

Physical and health hazards of the chemicals in the work area.

Details of the company hazard communication program, including:

An explanation of the labeling system.

The material safety data sheet.

How employees can obtain and use the appropriate hazard information.

Location of:
Written hazard communciation program.

List(s) of hazardous chemicals.

Material safety data sheets.

Protective measures employees can take, including:

Appropriate work practices.

Emergency procedures.

Personal protective equipment to be used.

Detection methods for presence or release of a hazardous chemical in the work area (e.g., continous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.).
Hazard communication law and worker rights.

Understanding material safety data sheets (MSDS) and understanding their uses

Procedures to report the need of a MSDS.

Chemical labeling requirements.

Location of the written hazard communication program.

Course Descriptions

Wednesday, November 03, 2004, 1:48 PM

Course Title = Federal Motor Carrier Highway Safety Regulations / Drivers

Federal Motor Carrier Highway Safety Regulations / Drivers

CFR Reference: 49 CFR 391.11

Course Category: DOT

Written Exam: Yes

CEU's: 0.0

Retraining Required: 0 months

Description:

A person shall not drive a motor vehicle unless he/she is qualified to drive a motor vehicle. Except as provided in §391.63, a motor carrier shall not require or permit a person to drive a commercial motor vehicle unless that person is qualified to drive a commercial motor vehicle.

Elements:

Except as provided in Subpart G of this part, a person is qualified to drive a motor vehicle if he/she:

Is at least 21 years old.

Can read and speak the English language sufficiently to converse with the general public, to understand highway traffic signs and signals in the English language, to respond to official inquiries, and to make entries on reports and records.

Can, by reason of experience, training, or both, safely operate the type of motor vehicle he/she drives.

Can, by reason of experience, training, or both, determine whether the cargo he/she transports (including baggage in a passenger-carrying motor vehicle) has been properly located, distributed, and secured in or on the motor vehicle he/she drives.

Is familiar with methods and procedures for securing cargo in or on the commercial motor vehicle he/she drives.

Is physically qualified to drive a motor vehicle in accordance with Subpart E - Physical Qualifications and Examinations of Part 391.

Has a currently valid commercial motor vehicle operator's license issued only from one State or jurisdiction.

Has prepared and furnished the motor carrier that employs him with the list of violations or the certificate as required by §391.27.

Is not disqualified to drive a motor vehicle under the rules in §391.15.

Has successfully completed a driver's road test and has been issued a certificate of driver's road test in accordance with §391.31, or has presented an operator's license or a certificate of road test which the motor carrier that employs him/her has accepted as equivalent to a road test in accordance with §391.33.

Has completed and furnished the motor carrier that employs him/her with an application for employment in accordance with §391.21.

Course Descriptions

Wednesday, November 03, 2004, 1:51 PM

Course Title = FMCSR/Drugs & Alcohol Use & Testing/Employer Policy

FMCSR/Drugs & Alcohol Use & Testing/Employer Policy

CFR Reference: 49 CFR 382.601

Course Category: DOT

Written Exam: No

CEU's: 0.0

Retraining Required: 0 months

Description:

Each employer must provide materials that explain the requirements of this part and the employer's policies and procedures with respect to meeting these requirements.

Elements:

The following information must be included in the materials:

The identity of the person designated by the employer to answer driver questions about the materials.

The categories of drivers who are subject to the provisions of part 382.

Sufficient information about the safety-sensitive functions performed by those drivers to make clear what period of the work day the driver is required to be in compliance with part 382.

Specific information concerning driver conduct that is prohibited.

The circumstances under which a driver will be tested for alcohol and/or drugs under part 382.

The procedures that will be used to test for the presence of alcohol and drugs, protect the driver and the integrity of the testing processes, safeguard the validity of the test results, and ensure that those results are attributed to the correct driver.

The requirement that a driver submit to alcohol and drug tests administered in accordance with part 382.

An explanation of what constitutes a refusal to submit to an alcohol or controlled substances test and the attendant consequences.

The consequences for drivers found to have violated subpart B, including the requirement that the driver be removed immediately from safety-sensitive functions, and the procedures under Sec. 382.605.

The consequences for drivers found to have an alcohol concentration of 0.02 or greater but less than 0.04.

Information concerning:

(a)The effects of alcohol and drug use on an individual' s health, work, and personal life;

(b) Signs and symptoms of an alcohol or drug problem (the driver's or a co-worker's); and

(c) Available methods of intervening when an alcohol or drug problem is suspected, including confrontation, referral to any employee assistance program and/or referral to management.

Optional Provision - The materials may also include information on additional employer policies with respect to the use or possession of alcohol or drugs. These additional policies must be clearly identified as based on the employer's independent authority.

Material Safety Data Sheet

bp

1. Chemical product and company identification

Product name	BLACK MASTERBATCH POLYETHYLENE (HDPE) ETHENE-HEXENE-1 COPOLYMER
MSDS#	0000002031
Historic MSDS#:	None.
Code	0000002031 (NAP)
Product use	Consumer products. Industrial applications.
Manufacturer	BP Amoco Chemical Company 150 West Warrenville Road Naperville, Illinois 60563-8460 USA Tel: 1 (877) 701-2726
Supplier	BP Amoco Chemical Company 150 West Warrenville Road Naperville, Illinois 60563-8460 USA Tel: 1 (877) 701-2726
EMERGENCY HEALTH INFORMATION:	1 (800) 447-8735 Outside the US: +1 703-527-3887 (CHEMTREC)
EMERGENCY SPILL INFORMATION:	1 (613) 996-6666 CANUTEC (Canada)
OTHER PRODUCT INFORMATION	1 (866) 4 BP - MSDS (866-427-6737 Toll Free - North America) email: bpcares@bp.com

2. Composition/information on ingredients

Ingredient name	CAS #	% by weight	LC50/LD50
Carbon black	1333-86-4	20-30	ORAL (LD50): Acute: >15400 mg/kg [Rat].
1-hexene, polymer with ethene	25213-02-9	70-80	Not available.

3. Hazards identification

Physical state Granular solid. Powder or flakes solid. Pellets.

Color Black.

Emergency overview

This product has been evaluated and does not require any hazard warning on the label under established regulatory criteria.

Handling and/or processing of this material may generate dust which may cause mechanical irritation of the eyes, skin, nose and throat.

Routes of entry Dermal contact. Eye contact. Inhalation. Ingestion.

Potential Health Effects

Eyes No significant irritation expected other than possible mechanical irritation. Heated material can cause thermal burns. When heated to decomposition it emits acrid smoke and irritating fumes.

Skin	No significant irritation expected other than possible mechanical irritation. Heated material can cause thermal burns.
Inhalation	Dust: Exposure to airborne concentrations well above the recommended exposure limits may cause irritation of the nose, throat, and lungs. Vapor: If heated to more than 300°C, the product may form vapors or fumes which could cause irritation of the respiratory tract, coughing, and shortness of breath.
Ingestion	No significant health hazards identified.

See toxicological Information (section 11)

4. First aid measures

Eye Contact	Hot material: Flush eyes with plenty of water for at least 15 minutes. Seek medical assistance for mechanical removal of this material from the eye. The use of flush fluid, other than water, is not recommended. Cold material: flush eyes with plenty of water. Get medical attention if irritation occurs.
Skin Contact	If burned by contact with hot material, flush skin immediately with large amounts of cold water. If possible, submerge area in cold water. No attempt should be made to detach polymer adhering to the skin or to remove clothing attached with molten material. Thermal burns require immediate medical attention. Cold material: Wash with soap and water.
Inhalation	If affected by fumes from heated material, remove from source of exposure and move the affected person into fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
Ingestion	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately.

5. Fire-fighting measures

Flammability of the product	May be combustible at high temperature.
Auto-ignition temperature	>343 °C
Flash point	Above 300°C decomposition occurs and flash of fumes may occur.
Products of combustion	These products are carbon oxides (CO, CO2). May also contain low levels of aldehydes, ketones, organic acids or hydrocarbons.
Unusual fire/explosion hazards	High dust concentrations have a potential for combustion or explosion. This material is not explosive as defined by established regulatory criteria.
Fire fighting media and instructions	In case of fire, use water spray (fog), foam or dry chemicals. Do not use water jet.
Protective clothing (fire)	Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

6. Accidental release measures

Personal Precautions	IN CASE OF A LARGE SPILL: Contact emergency personnel. Eliminate all ignition sources. Granules spilled on the floor can cause slipping. Fine dust clouds may form explosive mixtures with air. Do not touch or walk through spilled material. Use suitable protective equipment (See Section: "Exposure controls/personal protection"). Follow all fire fighting procedures (See Section: "Fire-fighting measures").
Environmental precautions and clean-up methods	If emergency personnel are unavailable vacuum or carefully scoop up spilled materials and place in an appropriate container for disposal. Avoid creating dusty conditions and prevent wind dispersal. Minimize contact of spilled material with soils to prevent runoff to surface waterways. See Section 13 for Waste Disposal Information.

Personal protection in case of a large spill	Chemical/Dust Goggles. Personnel should wear protective clothing.

7. Handling and storage

Handling

There is a risk of being splashed with molten materials. Heated material can cause thermal burns. Do not inhale fumes or vapor from molten product. Use with adequate ventilation.

When handling hot material, wear heat resistant protective gloves, clothing and face shield that are able to withstand the temperature of the heated product.

Pneumatic conveying of powder and pellets can generate large static electrical charges. Electrical discharge in presence of air can cause an explosion. Earth all equipment. High dust concentrations have a potential for combustion or explosion. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material.

Storage

Keep container tightly closed. Keep container in a cool, well-ventilated area. Keep away from heat and direct sunlight.

The main hazards are related to pallet stock slippage and forklift truck maneuvers, which can cause injury to personnel. It is recommended that adequate procedures covering storage handling of pallets are established and maintained. Best practice is to stack pallets no more than 2 high. These procedures must be kept up to date and regularly audited.

8. Exposure controls/personal protection

Occupational exposure limits

Ingredient name	Occupational exposure limits
Carbon black	**ACGIH TLV (United States, 9/2004).** TWA: 3.5 mg/m^3 8 hour(s).
1-hexene, polymer with ethene	**ACGIH TLV (United States, 2004).** TWA: 10 mg/m^3 8 hour(s). Form: Inhalable fraction TWA: 3 mg/m^3 8 hour(s). Form: Respirable fraction

Control Measures

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Hygiene measures

Wash hands after handling compounds and before eating, smoking, using lavatory, and at the end of day.

Personal protection

Eyes

Safety glasses with side shields. Use dust goggles if high dust concentration is generated.

Skin and Body

Hot material: Wear heat-resistant protective gloves, clothing and face shield that are able to withstand the temperature of the molten product.

Cold material: None required; however, use of protective clothing is good industrial practice.

Respiratory

Product processing, heat sealing of film, or operations involving the use of wires or blades heated above 300°C may produce dust, vapor or fumes. To minimize risk of overexposure to dust, vapor or fumes it is recommended that a local exhaust system is placed above the equipment, and that the working area is properly ventilated.

Hands

Hot material: Wear heat-resistant protective gloves that are able to withstand the temperature of molten product.

The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended

application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Feet	Consult your supervisor or S.O.P. for special handling directions

Consult local authorities for acceptable exposure limits.

9. Physical and chemical properties

Physical state	Granular solid. Powder or flakes solid. Pellets.
pH	Not available.
Odor	Odorless.
Odor threshold	Not available.
Color	Black.
Boiling point / Range	Not available.
Melting point / Range	110 to 135 °C
Specific Gravity	1.01 to 1.1
Density	Pellet density: 1010-1100 kg/m^3 (1.01 to 1.1 g/cm^3)
Vapor pressure	Not available.
Vapor Density (Air = 1)	Not available.
Evaporation rate	Not available.
Solubility	Insoluble
LogK_{ow}	Not available.

10. Stability and reactivity

Stability and Reactivity	The product is stable.
Conditions to avoid	Stable under recommended storage and handling conditions (See Section: "Handling and storage"). If heated to more than 300°C, the product may form vapors or fumes which could cause irritation of the respiratory tract, coughing, and shortness of breath. Avoid dusting when handling and avoid all possible sources of ignition (spark or flame). To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material.
Incompatibility with various substances	None identified.
Hazardous Decomposition Products	These products are carbon oxides (CO, CO_2). May also contain low levels of aldehydes, ketones, organic acids or hydrocarbons.
Hazardous polymerization	Will not occur.

11. Toxicological information

Chronic toxicity

Carcinogenic effects	SUSPECT CANCER HAZARD CONTAINS MATERIAL WHICH MAY CAUSE CANCER Risk of cancer depends on duration and level of exposure. Classified 2B (Possible for human.) by IARC: [Carbon black]
Mutagenic effects	No component of this product at levels greater than 0.1% is classified by established regulatory criteria as a mutagen.
Reproductive effects	No component of this product at levels greater than 0.1% is classified by established regulatory criteria as a reproductive toxin.

Teratogenic effects	No component of this product at levels greater than 0.1% is classified by established regulatory criteria as teratogenic or embryotoxic.
Other chronic toxicity data	This product may contain carbon black. Carbon black has been shown to cause lung tumors in rats at high exposure concentrations. These concentrations exceed the capacity of the lung to clear the carbon black particles, thus resulting in significant toxicity. The International Agency for Research on Cancer (IARC) has evaluated carbon black and found it to be possibly carcinogenic to humans (Group 2B). Because the components are encapsulated in the resin, the above mentioned health effects would not be expected under conditions of normal use.

12. Ecological information

Ecotoxicity	No testing has been performed by the manufacturer.
Persistence/degradability	Not inherently biodegradable (polymer).
Mobility	This product is not likely to move rapidly with surface or groundwater flows because of its low water solubility.
Bioaccumulative potential	This product is not expected to bioaccumulate through food chains in the environment.
Other ecological information	Wildlife may ingest plastic pellets or bags. Although not toxic, such materials may physically block the digestive system, causing starvation or death.

13. Disposal considerations

Waste information	Recycle to process, if possible. Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Dispose of in accordance with all applicable local and national regulations.

Consult your local or regional authorities.

14. Transport information

Not classified as hazardous for transport (DOT, TDG, IMO/IMDG, IATA/ICAO)

15. Regulatory information

U.S. Federal regulations	US INVENTORY (TSCA): In compliance.
WHMIS (Canada)	Not controlled under WHMIS (Canada).

If listed, this product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations for those regulated products.

Inventories	AUSTRALIAN INVENTORY (AICS): In compliance. CANADA INVENTORY (DSL): In compliance. CHINA INVENTORY (IECS): In compliance. EC INVENTORY (EINECS): In compliance. JAPAN INVENTORY (ENCS): In compliance. KOREA INVENTORY (ECL): In compliance. PHILIPPINE INVENTORY (PICCS): In compliance.

16. Other information

Label Requirements

This product has been evaluated and does not require any hazard warning on the label under established regulatory criteria.

History

Date of issue	03/23/2005.
Date of previous issue	03/22/2005.
Prepared by	Product Stewardship

Notice to reader

NOTICE : This Material Safety Data Sheet is based upon data considered to be accurate at the time of its preparation. Despite our efforts, it may not be up to date or applicable to the circumstances of any particular case. We are not responsible for any damage or injury resulting from abnormal use, from any failure to follow appropriate practices or from hazards inherent in the nature of the product.

Solutia Inc.

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: THERMINOL® VP1 Heat transfer fluid

Reference Number: 000000000211 Date: 12/03/2004

Company Information:

United States:
Solutia Inc.
575 Maryville Center Drive, P.O. Box 66760
St. Louis, MO 63166-6760
Emergency telephone: Chemtrec: 1-800-424-9300
Non-Emergency telephone: 1-314-674-6661

Canada:
Solutia Canada Inc.
6800 St. Patrick Street
LaSalle, PQ H8N 2H3
Emergency telephone: CANUTEC: 1-613-996-6666
Non-Emergency telephone: 1-314-674-6661

Mexico:
Solutia MEXICO, S. DE R.L. DE C.V.
Paseo de la Reforma No. 2654 Piso 3-A
Col. Lomas Altas
C.P. 11950 Mexico D.F.
Emergency telephone: SETIQ: (in Mexico) 01-800-002-1400
Non-Emergency telephone: (in Mexico) 01-55-5259-6800

Brazil:
Solutia Brazil Ltd.
Avenue Carlos Marcondes, 1200
CEP: 12241-420-São José dos Campos/SP-Brazil
Emergency telephone: 55 12 3932 7100 (PABX)
Non-Emergency telephone: 55 11 3365 1800 (PABX)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Form:	liquid
Colour:	clear to colourless
Odour:	characteristic

WARNING STATEMENTS

WARNING!
Causes eye irritation
Causes skin irritation
Causes respiratory tract irritation
Contains material which can cause liver and nerve damage

POTENTIAL HEALTH EFFECTS

Likely routes of exposure: eye and skin contact
inhalation

Eye contact:	Highly irritating to eyes.
Skin contact:	Highly irritating to skin. Prolonged or repeated skin contact may result in irritant dermatitis.
Inhalation:	Severely irritating if inhaled. No more than slightly toxic if inhaled. Significant adverse health effects are not expected to develop under normal conditions of exposure.
Ingestion:	No more than slightly toxic if swallowed. Significant adverse health effects are not expected to develop if only small amounts (less than a mouthful) are swallowed.
Signs and symptoms of overexposure:	headache fatigue nausea/vomiting indigestion abdominal pain tremors
Target organs/systems:	May cause liver damage May cause nerve damage

Refer to Section 11 for toxicological information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS No.	Average concentration	Concentration range	Units
diphenyl ether	101-84-8	73.5		%
biphenyl	92-52-4	26.5		%

4. FIRST AID MEASURES

If in eyes:	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove any contact lenses. Get medical attention. Remove material from skin and clothing.
If on skin:	Immediately flush the area with plenty of water. Remove contaminated clothing. Wash skin gently with soap as soon as it is available. Get medical attention. Wash clothing before reuse.
If inhaled:	Remove patient to fresh air. If not breathing, give artificial respiration. If breathing is difficult give oxygen. Remove material from eyes, skin and clothing.
If swallowed:	Immediate first aid is not likely to be required. A physician or Poison Control Center can be contacted for advice.

Wash heavily contaminated clothing before reuse.

5. FIRE FIGHTING MEASURES

Fire point:	127 C
Hazardous products of combustion:	carbon monoxide (CO); carbon dioxide; hydrocarbons
Extinguishing media:	Water spray, foam, dry chemical, or carbon dioxide
Unusual fire and explosion hazards:	None known
Fire fighting equipment:	Firefighters, and others exposed, wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.
Miscellaneous advice:	This product is not classified as a fire-resistant heat transfer fluid. Precautions to avoid sources of ignitions should be taken.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions:	Use personal protection recommended in section 8.
Environmental precautions:	Keep out of drains and water courses.
Methods for cleaning up:	Contain large spills with dikes and transfer the material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with an inert material and then place in a chemical waste container. Flush spill area with water.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable quantity information.

7. HANDLING AND STORAGE

Handling
Avoid contact with eyes, skin and clothing.
Avoid breathing vapour or mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Precautions against ignitions and fire should be taken with this product.
Heat transfer fluids are intended for INDIRECT heating purposes ONLY.
This product has not been approved for food grade use.

Emptied containers retain vapour and product residue. Observe all recommended safety precautions until container is cleaned, reconditioned or destroyed. Do not cut, drill, grind or weld on or near this container. The reuse of this material's container for non industrial purposes is prohibited and any reuse must be in consideration of the data provided in this material safety data sheet.

Storage
General: Stable under normal conditions of handling and storage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits: (ml/m3 = ppm)

THERMINOL® VP1	No specific occupational exposure limit has been established.
biphenyl	ACGIH TLV: 0.2 ml/m3 ; mist ; 8-hr TWA OSHA PEL: 0.2 ml/m3 ; 1.0 mg/m3 ; ; 8-hr TWA Mexican OEL: 0.2 ml/m3 ; 1.5 mg/m3 ; ; 8-hr TWA Mexican OEL: 0.6 ml/m3 ; 4 mg/m3 ; ; 15-min STEL
diphenyl ether	ACGIH TLV: 1 ml/m3 ; ; 8-hr TWA ACGIH TLV: 2 ml/m3 ; ; 15-min STEL OSHA PEL: 1 ml/m3 ; 7 mg/m3 ; ; 8-hr TWA Mexican OEL: 1 ml/m3 ; 7 mg/m3 ; ; 8-hr TWA Mexican OEL: 2 ml/m3 ; 14 mg/m3 ; ; 15-min STEL
Eye protection:	Wear safety goggles. Have eye flushing equipment available.
Hand protection:	Wear chemical resistant gloves. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application. See Solutia Glove Facts for permeation data.
Body protection:	Wear suitable protective clothing. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application. Wear full protective clothing if exposed to splashes. Wash contaminated skin promptly. Launder contaminated clothing and clean protective equipment before reuse. Wash thoroughly after handling. Have safety shower available at locations where skin contact can occur.
Respiratory protection:	Avoid breathing vapour or mist. Use approved respiratory protection equipment (full facepiece recommended) when airborne exposure limits are exceeded. If used, full facepiece replaces the need for face shield and/or chemical goggles. Consult the respirator manufacturer to determine the appropriate type of equipment for a given application. Observe respirator use limitations specified by the manufacturer.
Ventilation:	Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits. If practical, use local mechanical exhaust ventilation at sources of air contamination such as processing equipment.

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Flash point:	110 C 124 C	Pensky-Martens closed tester Cleveland Open Cup
Autoignition temperature:	612 C	ASTM D-2155
Density:	1.06 g/cm3 @ 25 C	

Boiling point :	257 C
Crystallising point :	12 C
Water solubility:	~25 mg/l

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Conditions to avoid:	All sources of ignition.
Materials to avoid:	Contact with strong oxidizing agents.
Hazardous reactions:	Hazardous polymerization does not occur.
Hazardous decomposition products:	None known;

11. TOXICOLOGICAL INFORMATION

This product has been tested for toxicity. Results from Solutia sponsored studies or from the available public literature are described below.

Acute animal toxicity data

Oral:	LD50 , rat, 2,050 mg/kg , No more than slightly toxic
Dermal:	LD50 , rabbit, > 5,010 mg/kg , Practically nontoxic after skin application in animal studies.
Inhalation:	LC50 , rat, 2.66 mg/l , 4 h, Toxic based on animal inhalation exposure studies.
Skin irritation:	rabbit , Slightly irritating to skin., 24 h
Repeat dose toxicity:	rat, inhalation, 13 weeks, Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies.
Repeat dose toxicity:	rat, gavage, 26 weeks, Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Effects only observed at very high dose levels.
Target organs affected	kidneys, liver, spleen
Repeat dose toxicity:	rat, diet, subchronic, Repeated oral exposure produced liver and kidney changes in animal models.
Target organs affected	liver, kidneys
Developmental toxicity:	rat, gavage, , No effects on offspring observed in laboratory animals in the presence of maternal toxicity.
Mutagenicity:	No genetic effects were observed in standard tests using bacterial and animal cells.

Components

Data from Solutia studies and/or the available scientific literature on the components of this material which have been identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200) or the Canadian Hazardous Products Act are discussed below.

biphenyl	Chronic exposure has been reported to cause headache, fatigue, nausea, indigestion, abdominal pain, tremor, central and peripheral nerve damage and liver injury. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Practically non irritating to skin (rabbit). Slightly irritating to eyes (rabbit). No mortality or signs of toxicity at the highest level achievable. Irritating to respiratory system in animal models. Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Produced no dermal sensitization (guinea pigs). No effects on offspring observed in laboratory animals in the presence of maternal toxicity. No genetic effects were observed in standard tests using bacterial and animal cells.
diphenyl ether	Predictive patch testing on human volunteers did not produce irritation or sensitization. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Slightly irritating to eyes (rabbit). Slightly irritating to skin (rabbit). Repeated exposure produced respiratory tract irritation in animal models. Repeated exposure produced eye irritation in animal models. No genetic effects were observed in standard tests using bacterial and animal cells.

12. ECOLOGICAL INFORMATION

Environmental Toxicity:

Invertebrates	48 h, EC50	Water flea (Daphnia magna)	2.4 mg/l
Fish:	96 h, LC50	Rainbow trout (Oncorhynchus mykiss)	7.6 mg/l
	96 h, LC50	Fathead minnow (Pimephales promelas)	24 mg/l
Algae:	96 h, EC50	Algae (Selenastrum capricornutum)	1.3 mg/l
Biodegradation	Modified SCAS (OECD 302A) Primary degradation 99 %		

13. DISPOSAL CONSIDERATIONS

US EPA RCRA Status: This material when discarded may be a hazardous waste as that term is defined by the Resource Conservation and Recovery Act (RCRA), 40 CFR 261.24, due to its toxicity characteristic. This material should be analyzed in accordance with Method 1311 for the compound(s) below.

US EPA RCRA hazardous waste number:	D018	Compound/Characteristic:	BENZENE

Disposal considerations: Incineration

Miscellaneous advice: This product meets the criteria for a synthetic used oil under the U.S. EPA Standards for the Management of Used Oil (40 CFR 279). Those standards govern recycling and disposal in lieu of 40 CFR 260 -272 of the Federal hazardous waste program in states that have adopted these used oil regulations. Consult your attorney or appropriate regulatory official to be sure these standards have been adopted in your state. Recycle or burn in accordance with the applicable standards.
Solutia operates a used fluid return program for certain fluids under these used oil standards. Contact your Sales Representative for details.
This product should not be dumped, spilled, rinsed or washed into sewers or public waterways.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper shipping name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. *biphenyl*
Hazard Class:	9
Hazard Identification number:	UN3082
Packing Group:	Packing Group III
Transport label:	Class 9
Special provisions:	This material meets the definition of a marine pollutant.
Other:	Applies ONLY to containers with an RQ or for shipments in bulk or via intercoastal water transportation.

Canadian TDG

Other:	Not regulated for transport.

Reportable Quantity/Limit

US DOT RQ 100 lb *biphenyl*
Package size containing reportable amount: 377 lb

ICAO/IATA Class

Other:	See DOT Information

15. REGULATORY INFORMATION

All components are in compliance with the following inventories:	U.S. TSCA, EU EINECS, Canadian DSL, Australian AICS, Korean, Japanese ENCS, Phillipine PICCS, Chinese
Canadian WHMIS classification:	D2(A) - Materials Causing Other Toxic Effects D2(B) - Materials Causing Other Toxic Effects

SARA Hazard Notification:

Hazard Categories Under Title III Rules (40 CFR 370):	Immediate Delayed
Section 302 Extremely Hazardous	Not applicable

Substances:

Section 313 Toxic Chemical(s): biphenyl

CERCLA Reportable Quantity:

100 lbs biphenyl
For this/these chemicals, release of more than the Reportable Quantity to the environment in a 24 hour period requires notification to the National Response Center (800-424-8802 or 202-426-2675).

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Refer to Section 11 for OSHA/HPA Hazardous Chemical(s) and Section 13 for RCRA classification.

Safety data sheet also created in accordance with Brazilian law NBR 14725

16. OTHER INFORMATION

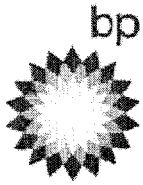
Product use: Heat transferring agents

Reason for revision: New ANSI Standard

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	2	1	0	
Suggested HMIS Rating:	2	1	0	G

Prepared by the Solutia Hazard Communication Group. Please consult Solutia @ 314-674-6661 if further information is needed.

MATERIAL SAFETY DATA SHEET



C14 ALPHA OLEFIN SULFONATE

FOR R&D USE ONLY.

MSDS No. 12499000 ANSI/ENGLISH

1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: C14 ALPHA OLEFIN SULFONATE

MANUFACTURER/SUPPLIER:

Amoco Chemical Company
200 East Randolph Drive
Chicago, Illinois 60601 U.S.A.

EMERGENCY HEALTH INFORMATION:
1 (800) 447-8735

EMERGENCY SPILL INFORMATION:
1 (800) 424-9300 CHEMTREC (USA)

OTHER PRODUCT SAFETY INFORMATION:
(630) 836-5441

2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS#	Range % by Wt.
1-Tetradecene	1120-36-1	>80
1-Dodecene	112-41-4	1-5
1-Octadecene	112-88-9	1-5
1-Hexadecene	629-73-2	<20
Sulfonates		

(See Section 8.0, "Exposure Controls/Personal Protection", for exposure guidelines)

3.0 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Warning! Causes eye irritation. Causes respiratory irritation. Harmful or fatal if liquid is aspirated into lungs.

POTENTIAL HEALTH EFFECTS:

EYE CONTACT: Causes eye irritation.

SKIN CONTACT: No significant health hazards identified.

INHALATION: Causes respiratory irritation.

INGESTION: Harmful or fatal if liquid is aspirated into lungs. See "Toxicological Information" section (Section 11.0).

HMIS CODE: (Health:2) (Flammability:0) (Reactivity:0)

NFPA CODE: (Health:2) (Flammability:0) (Instability:0)

4.0 FIRST AID MEASURES

EYE: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

SKIN: Wash exposed skin with soap and water.

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get medical attention.

INGESTION: If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention.

5.0 FIRE FIGHTING MEASURES

FLASHPOINT: Greater than 200°F (93°C)

UEL: Not determined.

LEL: Not determined.

AUTOIGNITION TEMPERATURE: Not determined.

FLAMMABILITY CLASSIFICATION: Not Flammable.

EXTINGUISHING MEDIA: Agents approved for Class B hazards (e.g., dry chemical, carbon dioxide, foam, steam) or water fog.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None identified.

FIRE-FIGHTING EQUIPMENT: Firefighters should wear full bunker gear, including a positive pressure self-contained breathing apparatus.

PRECAUTIONS: Keep away from sources of ignition (e.g., heat and open flames).

HAZARDOUS COMBUSTION PRODUCTS: Incomplete burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

6.0 ACCIDENTAL RELEASE MEASURES

Remove mechanically or contain on an absorbent material such as dry sand or earth. Keep out of sewers and waterways.

7.0 HANDLING AND STORAGE

HANDLING: Use with adequate ventilation. Keep away from ignition sources (e.g., heat, sparks, or open flames).

STORAGE: Store under nitrogen. Store in cool, dry, well-ventilated area. Store away from heat, ignition sources, and open flame in accordance with applicable regulations. Keep container closed.

8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

EYE: Do not get in eyes. Wear chemical goggles.

SKIN: None required; however, use of protective gloves/clothing is good industrial practice.

INHALATION: Use with adequate ventilation. If heated and ventilation is inadequate, use a NIOSH-certified respirator which will protect against organic vapor and dust/mist.

ENGINEERING CONTROLS: Local exhaust ventilation is recommended at source of heated vapors.

EXPOSURE GUIDELINES:

Component	CAS#	Exposure Limits
1-Tetradecene	1120-36-1	No exposure limit established
1-Dodecene	112-41-4	No exposure limit established
1-Octadecene	112-88-9	No exposure limit established
1-Hexadecene	629-73-2	No exposure limit established
Sulfonates		No exposure limit established

9.0 CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE AND ODOR: Amber. Liquid. Soapy odor.

pH: Not determined.

VAPOR PRESSURE: Not determined

VAPOR DENSITY: Not determined.

BOILING POINT: Not determined

MELTING POINT: Not determined.

SOLUBILITY IN WATER: Totally soluble.

SPECIFIC GRAVITY (WATER=1): Not determined

10.0 STABILITY AND REACTIVITY

STABILITY: Stable.

CONDITIONS TO AVOID: Keep away from ignition sources (e.g. heat, sparks, and open flames).

MATERIALS TO AVOID: Avoid contact with strong oxidizing agents.

HAZARDOUS DECOMPOSITION: Oxides of carbon may be released when heated to decomposition.

HAZARDOUS POLYMERIZATION: Will not occur.

11.0 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA:

EYE IRRITATION: Testing not conducted. See Other Toxicity Data.

SKIN IRRITATION: Testing not conducted. See Other Toxicity Data.

DERMAL LD50: Testing not conducted. See Other Toxicity Data.

ORAL LD50: Testing not conducted. See Other Toxicity Data.

INHALATION LC50: Testing not conducted. See Other Toxicity Data.

OTHER TOXICITY DATA: Specific toxicity tests have not been conducted on this product. Our hazard evaluation is based on information from similar products, the ingredients, technical literature, and/or professional experience.

Aspiration of this material into the lungs can cause chemical pneumonia and can be fatal. Aspiration into the lungs can occur while vomiting after ingestion of this material.

No component of this product at levels greater than 0.1% is identified as a carcinogen by ACGIH or the International Agency for Research on Cancer (IARC). No component of this product present at levels greater than 0.1% is identified as a carcinogen by the U.S. National Toxicology Program (NTP) or the U.S. Occupational Safety and Health Act (OSHA).

12.0 ECOLOGICAL INFORMATION

Ecological testing has not been conducted on this product by Amoco.

13.0 DISPOSAL INFORMATION

Disposal must be in accordance with applicable federal, state, or local regulations.

14.0 TRANSPORTATION INFORMATION

U.S. DEPT OF TRANSPORTATION

Shipping Name Not Regulated

INTERNATIONAL INFORMATION:

Sea (IMO/IMDG)

Shipping Name Not determined.

Air (ICAO/IATA)

Shipping Name Not determined.

European Road/Rail (ADR/RID)

Shipping Name Not determined.

Canadian Transportation of Dangerous Goods

Shipping Name Not determined.

15.0 REGULATORY INFORMATION

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR Part 302.4): This product is not reportable under 40 CFR Part 302.4.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA TITLE III SECTIONS 311/312 HAZARDOUS CATEGORIZATION (40 CFR Part 370): This product is defined as hazardous by OSHA under 29 CFR Part 1910.1200(d). Hazardous categories for this product are: Acute = yes; Chronic = no; Fire = no; Pressure = no; Reactive = no.

SARA TITLE III SECTION 313 (40 CFR Part 372): This product is not regulated under Section 313 of SARA and 40 CFR Part 372.

U.S. INVENTORY (TSCA): One or more components not listed on inventory - For research and development purposes only.

OSHA HAZARD COMMUNICATION STANDARD: Irritant.

EC INVENTORY (EINECS/ELINCS): Not determined.

JAPAN INVENTORY (MITI): Not determined.

AUSTRALIA INVENTORY (AICS): Not determined.

KOREA INVENTORY (ECL): Not determined.

CANADA INVENTORY (DSL): Not determined.

PHILIPPINE INVENTORY (PICCS): Not determined.

16.0 OTHER INFORMATION

Prepared by:

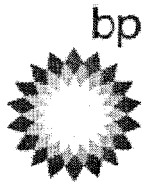
Environment, Health and Safety Department

Issued: November 12, 1998

This Material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

MATERIAL SAFETY DATA SHEET



C1620 ALPHA OLEFINS
CAS NO.: 68855-60-7

MSDS No. 11851000 ANSI/ENGLISH

1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: C1620 ALPHA OLEFINS

MANUFACTURER/SUPPLIER:

Amoco Chemical Company
200 East Randolph Drive
Chicago, Illinois 60601 U.S.A.

EMERGENCY HEALTH INFORMATION:
1 (800) 447-8735

EMERGENCY SPILL INFORMATION:
1 (800) 424-9300 CHEMTREC (USA)

OTHER PRODUCT SAFETY INFORMATION:
(312) 856-3304

2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS#	Range % by Wt.
1-Octadecene	112-88-9	59
1-Hexadecene	629-73-2	32
1-Eicosene	3452-07-1	7.2

(See Section 8.0, "Exposure Controls/Personal Protection", for exposure guidelines)

3.0 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product has been evaluated and does not require any hazard warning

on the label under OSHA criteria.

POTENTIAL HEALTH EFFECTS:

EYE CONTACT: No significant irritation expected.

SKIN CONTACT: No significant irritation expected.

INHALATION: May cause drowsiness at high vapor concentrations.

INGESTION: Harmful if aspirated into the lungs.

HMIS CODE: (Health:1) (Flammability:0) (Reactivity:0)

NFPA CODE: (Health:1) (Flammability:0) (Reactivity:0)

4.0 FIRST AID MEASURES

EYE: Flush eyes with plenty of water.

SKIN: Wash exposed skin with soap and water.

INHALATION: If adverse effects occur, remove to uncontaminated area.

INGESTION: If swallowed, drink plenty of water, do NOT induce vomiting. Get medical attention.

5.0 FIRE FIGHTING MEASURES

FLASHPOINT: 275.0°F(135.0°C) (Pensky-Martens closed cup)

UEL: 3.4%

LEL: 0.4%

AUTOIGNITION TEMPERATURE: Not determined.

FLAMMABILITY CLASSIFICATION: Not Flammable.

EXTINGUISHING MEDIA: Agents approved for Class B hazards (e.g., dry chemical, carbon dioxide, foam, steam) or water fog.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None identified.

FIRE-FIGHTING EQUIPMENT: Firefighters should wear full bunker gear, including a positive pressure self-contained breathing apparatus.

PRECAUTIONS: Avoid breathing smoke and vapor.

HAZARDOUS COMBUSTION PRODUCTS: Incomplete burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

6.0 ACCIDENTAL RELEASE MEASURES

Remove mechanically or contain on an absorbent material such as dry sand or earth. Keep out of sewers and waterways.

7.0 HANDLING AND STORAGE

HANDLING: Use with adequate ventilation.

STORAGE: Store in cool, dry, well-ventilated area. Store away from heat, ignition sources, and open flame in accordance with applicable regulations. Keep container closed.

8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

EYE: Wear chemical goggles.

SKIN: Wear protective clothing and gloves, including shoes that cannot be penetrated by chemicals or oil, if prolonged or repeated contact is likely.

INHALATION: Use with adequate ventilation. If ventilation is inadequate, use supplied- air respirator approved by NIOSH.

ENGINEERING CONTROLS: Local exhaust ventilation is recommended at source of heated vapors.

EXPOSURE GUIDELINES:

Component	CAS#	Exposure Limits
1-Octadecene	112-88-9	No exposure limit established
1-Hexadecene	629-73-2	No exposure limit established
1-Eicosene	3452-07-1	No exposure limit established

9.0 CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE AND ODOR: Liquid. Colorless. Hydrocarbon odor.

pH: Not determined.

VAPOR PRESSURE: 0.1 mm Hg at 20.0 °C

VAPOR DENSITY: 8.2 (Air=1)

BOILING POINT: 545.0°F to 601.0°F (285.0°C to 316.0°C) (range)

MELTING POINT: Not determined.

SOLUBILITY IN WATER: Negligible, below 0.1%.

SPECIFIC GRAVITY (WATER=1): 0.79

10.0 STABILITY AND REACTIVITY

STABILITY: Stable.

CONDITIONS TO AVOID: Keep away from ignition sources (e.g. heat, sparks, and open flames).

MATERIALS TO AVOID: Avoid contact with strong oxidizing agents.

HAZARDOUS DECOMPOSITION: Oxides of carbon may be released when heated to decomposition.

HAZARDOUS POLYMERIZATION: Will not occur.

11.0 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA:

EYE IRRITATION: Testing not conducted. See Other Toxicity Data.

SKIN IRRITATION: Testing not conducted. See Other Toxicity Data.

DERMAL LD50: Testing not conducted. See Other Toxicity Data.

ORAL LD50: Testing not conducted. See Other Toxicity Data.

INHALATION LC50: Testing not conducted. See Other Toxicity Data.

OTHER TOXICITY DATA: Toxicity information available upon request.

No component of this product present at levels greater than 0.1% is identified as a carcinogen by the U.S. National Toxicology Program, the U.S. Occupational Safety and Health Act, or the International Agency on Research on Cancer (IARC).

12.0 ECOLOGICAL INFORMATION

Ecological testing has not been conducted on this product by Amoco.

13.0 DISPOSAL INFORMATION

Disposal must be in accordance with applicable federal, state, or local regulations.

14.0 TRANSPORTATION INFORMATION

U.S. DEPT OF TRANSPORTATION

Shipping Name Not Regulated

INTERNATIONAL INFORMATION:

Sea (IMO/IMDG)

Shipping Name Not Regulated

Air (ICAO/IATA)

Shipping Name Not Regulated

European Road/Rail (ADR/RID)

Shipping Name Not determined.

Canadian Transportation of Dangerous Goods

Shipping Name Not Regulated

15.0 REGULATORY INFORMATION

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR Part 302.4): This product is not reportable under 40 CFR Part 302.4.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA TITLE III SECTIONS 311/312 HAZARDOUS CATEGORIZATION (40 CFR Part 370): Hazardous categories for this product are: Acute = no; Chronic = no; Fire = no; Pressure = no; Reactive = no.

SARA TITLE III SECTION 313 (40 CFR Part 372): This product is not regulated under Section 313 of SARA and 40 CFR Part 372.

U.S. INVENTORY (TSCA): Listed on inventory.

OSHA HAZARD COMMUNICATION STANDARD: Not hazardous per 29 CFR 1910.1200(d).

EC INVENTORY (EINECS/ELINCS): In compliance.

JAPAN INVENTORY (MITI): Listed on inventory.

AUSTRALIA INVENTORY (AICS): Listed on inventory.

KOREA INVENTORY (ECL): Listed on inventory.

CANADA INVENTORY (DSL): All of the components of this product are listed on the DSL.

PHILIPPINE INVENTORY (PICCS): Nominated.

16.0 OTHER INFORMATION

Prepared by:

Environment, Health and Safety Department

Issued: September 04, 1996

Supersedes: May 14, 1996

This Material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

MATERIAL SAFETY DATA SHEET

PASADENA GAS OIL

MSDS No. 12750 US/ENGLISH

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER/SUPPLIER:
Amoco Chemical Company
200 East Randolph Drive
Chicago, Illinois 60601 U.S.A.

EMERGENCY HEALTH INFORMATION:
1 (800) 447-8735

EMERGENCY SPILL INFORMATION:
1 (800) 424-9300 CHEMTREC (USA)

OTHER PRODUCT SAFETY INFORMATION:
1 (630) 434-5776 (USA)

SUBSTANCE: PASADENA GAS OIL

CREATION DATE: Jan 07 2000
REVISION DATE: Jan 18 2000

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: HEAVY OLEFINS/PARAFFINS, C18-C36
CAS NUMBER: Not assigned.
EC NUMBER: Not assigned.
PERCENTAGE: 60-100

COMPONENT: HEAVY ALCOHOLS, C18-C30
CAS NUMBER: Not assigned.
EC NUMBER: Not assigned.
PERCENTAGE: 10-30

COMPONENT: ALKYLATED ANILINE DERIVATIVES
CAS NUMBER: Not assigned.
EC NUMBER: Not assigned.
PERCENTAGE: 0-5

(See Section 8, "Exposure Controls, Personal Protection", for exposure guidelines)

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=2 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: brown
PHYSICAL FORM: liquid
ODOR: fatty alcohol odor
SIGNAL WORD: WARNING!
MAJOR HEALTH HAZARDS: Causes eye and skin irritation.
PHYSICAL HAZARDS: Combustible liquid and vapor.

POTENTIAL HEALTH EFFECTS:
INHALATION:
No significant health hazards identified.
SKIN CONTACT:
Causes skin irritation.
EYE CONTACT:
Causes eye irritation.
INGESTION:
Harmful or fatal if liquid is aspirated into lungs. See Toxicological Information section (Section 11).

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Get medical attention.

SKIN CONTACT: Wash exposed skin with soap and water. Remove contaminated clothing and thoroughly clean and dry before reuse. Get medical attention if irritation develops.

EYE CONTACT: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If swallowed, do NOT induce vomiting. Get immediate medical attention.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Moderate fire hazard. Vapor/air mixtures are explosive above

flash point.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical, regular foam, water

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

FIRE FIGHTING PROTECTIVE EQUIPMENT: Firefighters should wear full bunker gear, including a positive pressure self contained breathing apparatus.

FLASH POINT: >140 F (>60.0 C)
FLAMMABILITY CLASSIFICATION: Combustible Liquid.

HAZARDOUS COMBUSTION PRODUCTS:
Combustion products: oxides of carbon, oxides of nitrogen

SECTION 6 ACCIDENTAL RELEASE MEASURES

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Keep out of water supplies and sewers.

SECTION 7 HANDLING AND STORAGE

STORAGE: Store in a cool, dry, well-ventilated area. Store away from heat, ignition sources, and open flame in accordance with applicable regulations. Keep container tightly closed.

HANDLING: Keep away from heat, sparks and flame. Use with adequate ventilation. Ground and bond containers when transferring materials. Do not cut, puncture, or weld on or near this container. After this container has been emptied, it may contain flammable vapors; observe all warnings and precautions listed for this product.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
ALKYLATED ANILINE DERIVATIVES:
ANILINE:
5 ppm (19 mg/m3) OSHA TWA (skin)
2 ppm (8 mg/m3) OSHA TWA (skin) (vacated by 58 FR 35338, June 30, 1993)
2 ppm (8 mg/m3) ACGIH TWA (skin)
2 ppm (10 mg/m3) MEXICO TWA (skin)
5 ppm (20 mg/m3) MEXICO STEL (skin)

VENTILATION: Control airborne concentrations below the exposure guidelines.

EYE PROTECTION: Do not get in eyes. Wear chemical goggles.

CLOTHING: Do not get on skin or clothing. Wear suitable protective clothing.

GLOVES: Wear suitable gloves.

RESPIRATOR: Use with adequate ventilation. If ventilation is inadequate, use a NIOSH certified respirator with an organic vapor cartridge and P95 particulate filter.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid
COLOR: brown
TEXTURE: viscous
ODOR: fatty alcohol odor
BOILING POINT: Not available
FREEZING POINT: Not available
POUR POINT: >106 F (>41 C)
VAPOR PRESSURE: Not available
VAPOR DENSITY: Not available
SPECIFIC GRAVITY (water=1): 0.81-0.85 @ 16 C
WATER SOLUBILITY: <0.1%
PH: Not available
VOLATILITY: Not available
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not available
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

INCOMPATIBILITIES: strong oxidizing materials

HAZARDOUS DECOMPOSITION:
Combustion products: oxides of carbon, oxides of nitrogen
Thermal decomposition products: oxides of carbon

POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

EYE IRRITATION: Testing not conducted. See Other Toxicity Data.

SKIN IRRITATION: Testing not conducted. See Other Toxicity Data.

DERMAL LD50: Testing not conducted. See Other Toxicity Data.

ORAL LD50: Testing not conducted. See Other Toxicity Data.

INHALATION LC50: Testing not conducted. See Other Toxicity Data.

OTHER TOXICITY DATA:
Specific toxicity tests have not been conducted on this product. Our hazard evaluation is based on information from similar products, the ingredients, technical literature, and/or professional experience.

Exposure to aniline can produce methemoglobin in the blood. Symptoms may include cyanosis (bluish color beginning with the lips and ears), euphoria, and headaches. It is unknown whether the alkylated aniline compounds present in this product can produce methemoglobinemia.

No component of this product present at levels greater than 0.1% is identified as a carcinogen by the U.S. National Toxicology Program, the U.S. Occupational Safety and Health Act, or the International Agency on Research on Cancer (IARC).

SECTION 12 ECOLOGICAL INFORMATION

Ecological testing has not been conducted on this product by BP Amoco.

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. The container for this product can present explosion or fire hazards, even when emptied! To avoid risk of injury, do not cut, puncture or weld on or near this container. Since the emptied containers retain product residue, follow product insert warnings even after container is emptied.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101 SHIPPING NAME-ID NUMBER:
Combustible liquid, n.o.s. (OLEFINS, PARAFFINS)-NA1993

U.S. DOT 49 CFR 172.101 HAZARD CLASS OR DIVISION:
Combustible liquid

U.S. DOT 49 CFR 172.101 PACKING GROUP:
III

U.S. DOT 49 CFR 172.101 AND SUBPART E LABELING REQUIREMENTS:
None

U.S. DOT 49 CFR 172.101 PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.203
BULK PACKAGING: 49 CFR 173.241

U.S. DOT 49 CFR 172.101 QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: 60 L
CARGO AIRCRAFT ONLY: 220 L

CANADIAN TRANSPORTATION OF DANGEROUS GOODS: Not regulated.

LAND TRANSPORT ADR/RID: Not regulated.

AIR TRANSPORT IATA/ICAO: Not regulated.

MARITIME TRANSPORT IMDG: Not regulated.

SECTION 15 REGULATORY INFORMATION

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR Part 302.4): This product is not reportable under 40 CFR Part 302.4.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA TITLE III SECTION 311/312 HAZARDOUS CATEGORIZATION (40 CFR Part 370):
ACUTE: Y
CHRONIC: Y
FIRE: Y
REACTIVE: N
SUDDEN RELEASE: N

SARA TITLE III SECTION 313 (40 CFR Part 372): This product is not regulated under Section 313 of SARA and 40 CFR Part 372.

STATE REGULATIONS:
California Proposition 65: N

TSCA INVENTORY STATUS: Listed on inventory.

OSHA HAZARD COMMUNICATION STANDARD: Combustible liquid. Irritant.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

24-Hour Emergency Phone Number: 989-636-4400

Product:DOWTHERM* A HEAT TRANSFER FLUID

Product Code: 25576

Effective Date: 04/28/03 Date Printed: 06/16/04 MSD: 000412

The Dow Chemical Company, Midland, MI 48674

Customer Information Center: 800-258-2436

2. COMPOSITION/INFORMATION ON INGREDIENTS

Diphenyl oxide (phenyl ether)	CAS# 000101-84-8	73%
Biphenyl	CAS# 000092-52-4	27%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

****

* White to straw-colored liquid. Aromatic odor. May cause skin irritation. May cause respiratory tract irritation. Highly toxic to fish and/or other aquatic organisms. *

****

POTENTIAL HEALTH EFFECTS (See Section 11 for toxicological data.)

EYE: May cause pain. May cause slight (temporary) eye irritation. Vapors may irritate eyes.

SKIN: Prolonged or repeated exposure may cause skin irritation, even a burn. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts.

INGESTION: Single dose oral toxicity is considered to be low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury. Observations in animals include liver and kidney injury.

INHALATION: Excessive exposure may cause irritation to upper

(Continued on page 2 , over)

respiratory tract (nose and throat) and lungs. May cause headache and nausea due to odor.

SYSTEMIC & OTHER EFFECTS: For diphenyl oxide: Observations in animals include respiratory effects. For biphenyl: In humans, effects have been reported on the following organs: central nervous system, liver and peripheral nervous system. In animals, effects have been reported on the following organs: gastrointestinal tract and kidney. Signs and symptoms of excessive exposure may be nausea and/or vomiting. Signs and symptoms of excessive exposure may be abdominal cramps and/or diarrhea.

CANCER INFORMATION: Available data are inadequate to evaluate carcinogenicity.

TERATOLOGY (BIRTH DEFECTS): Birth defects are unlikely. Even exposures having an adverse effect on the mother should have no effect on the fetus.

REPRODUCTIVE EFFECTS: Contains component(s) which have been shown to interfere with reproduction in animal studies. (Only at a dose producing generalized toxicity)

4. FIRST AID

EYES: Flush eyes thoroughly with water for several minutes. Remove contact lenses after initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

SKIN: Wash skin with plenty of water.

INGESTION: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

5. FIRE FIGHTING MEASURES

(Continued on page 3)

FLASH POINT: 236F, 113C
METHOD USED: TCC
AUTOIGNITION TEMPERATURE: 1110F, 599C

FLAMMABLE LIMITS
LFL: 0.8% (347F, 175C)
UFL: 7.0% (347F, 175C)

HARDOUS COMBUSTION PRODUCTS: During a fire, smoke may contain the original material in addition to unidentified toxic and/or irritating compounds. Hazardous combustion products may include and are not limited to carbon monoxide, carbon dioxide.

OTHER FLAMMABILITY INFORMATION: Dense smoke is produced when product burns. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Flammable concentrations of vapor can accumulate at temperatures above 236.0 F. Liquid mist of this product can burn. Spills of these organic liquids on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

EXTINGUISHING MEDIA: Water fog or fine spray. Carbon dioxide. Dry chemical. Foam. Water fog, applied gently may be used as a blanket for fire extinguishment. Do not use direct water stream. May spread fire. General purpose synthetic foams (including AFFF type) or protein foams may be used. Alcohol resistant foams (ATC type) may also function.

MEDIA TO BE AVOIDED: Do not use direct water stream. Keep people away. Isolate fire area and deny unnecessary entry. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog, applied gently may be used as a blanket for fire extinguishment. Do not use direct water stream. May spread fire. Review the "Accidental Release Measures: and the "Ecological Information" sections of this MSDS. Contain fire water run-off if possible. Fire water run-off, if not contained may cause environmental damage.

PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES (See Section 15 for Regulatory Information)

(Continued on page 4 , over)

PROTECT PEOPLE: Clear non-emergency personnel from area.

PROTECT THE ENVIRONMENT: Contain spilled material to prevent contamination of soil, surface water or ground water. Material is heavier than water and has limited water solubility. It will collect on the lowest surface.

CLEANUP: Dike spill: Collect in suitable and properly labeled containers.

7. HANDLING AND STORAGE

HANDLING: See Section 8, Exposure Controls/Personal Protection.

STORAGE: See Section 10, Stability and Reactivity.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines.

PERSONAL PROTECTIVE EQUIPMENT
EYE/FACE PROTECTION: Use safety glasses. If vapor exposure causes eye discomfort, use a full-face respirator.

SKIN PROTECTION: When prolonged or frequently repeated contact could occur, use protective clothing impervious to this material. Selection of specific items such as faceshield, gloves, boots, apron, or full-body suit will depend on operation.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator.

EXPOSURE GUIDELINE(S):
Phenyl ether (diphenyl oxide): ACGIH TLV is 1 ppm TWA, 2 ppm STEL. OSHA PEL is 1 ppm.
Diphenyl (1,1-biphenyl): ACGIH TLV and OSHA PEL are 0.2 ppm.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE/PHYSICAL STATE: White to straw-colored liquid

(Continued on page 5)

ODOR: Aromatic odor
BOILING POINT: 495F, 257C
VAPOR PRESSURE: 0.025 mmHg @ 25C
VAPOR DENSITY: Greater than 1
SOLUBILITY/MISCIBILITY IN WATER: 13.8ppm @ 60F
SPECIFIC GRAVITY OR DENSITY: 1.050-1.075 @ 25/25C

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Thermally stable at typical use temperatures.

CONDITIONS TO AVOID: Product can decompose at elevated temperatures.

HAZARDOUS DECOMPOSITION PRODUCTS: Hazardous decomposition products depend upon temperature, air supply and the presence of other materials. Hazardous decomposition products may include trace amounts of benzene, phenol.

INCOMPATABILITY WITH OTHER MATERIALS: Avoid contact with oxidizing materials.

11. TOXICOLOGICAL INFORMATION (See Section 3 for Potential Health Effects. For detailed toxicological data, write or call the address or non-emergency number shown in Section 1)

SKIN: The dermal LD50 has not been determined.

INGESTION: The oral LD50 for rats is > 2000 mg/kg.

MUTAGENICITY (EFFECTS ON GENETIC MATERIAL): In vitro mutagenicity studies were negative. Animal mutagenicity studies were negative.

12. ECOLOGICAL INFORMATION (For detailed Ecological data, write or call the address or non-emergency number shown in Section 1)

ENVIRONMENTAL FATE

MOVEMENT & PARTITIONING: Based largely or completely on data for major component(s). Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Potential for mobility in soil is low (Koc between 500 and 2000).

DEGRADATION & PERSISTENCE: Biodegradation under aerobic static

(Continued on page 6 , over)

laboratory conditions is high (BOD20 or BOD28/ThOD greater than 40%). Biodegradation is expected to be achievable in a secondary wastewater treatment plant. 20-Day biochemical oxygen demand (BOD20) is 2.21 p/p. 5-Day biochemical oxygen demand (BOD5) is 1.70 p/p. Theoretical oxygen demand (ThOD) is calculated to be 2.73 p/p.

ECOTOXICITY: Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in most sensitive species). Acute LC50 in water flea Daphnia magna is 0.29 mg/L. Acute LC50 in grass shrimp (Palaemonetes pugio) is 1.6 mg/L. Acute LC50 in bluegill (Lepomis macrochirus) is 2.11 mg/L. Acute LC50 in channel catfish (Ictalurus punctatus) is 2.35 mg/L. Acute LC50 in rainbow trout (Oncorhynchus mykiss) is 2.72 mg/L. Acute LC50 in fathead minnow (Pimephales promelas) is 9.6 mg/L. Acute LC50 in sheepshead minnow (Cyprinodon variegatus) is 55 mg/L.

13. DISPOSAL CONSIDERATIONS (See Section 15 for Regulatory Information)

DISPOSAL: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. THE DOW CHEMICAL COMPANY HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION 2 (Composition/Information On Ingredients).

Dow maintains a Fluid Credit Program. Unused, uncontaminated material may, under certain circumstances, be returned for fluid credit. For used material additional evaluation is required. Call Dow Thermal Fluids Technical Service & Development, collect at 989-636-3318 for further information. Other options are listed below.

FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: incinerator or other thermal destruction device.

As a service to its customers, Dow can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or

(Continued on page 7)

manage chemicals or plastics, and that manage used drums. Telephone Dow's Customer Information Center at 800-258-2436 or 989-832-1556 for further details.

14. TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION (D.D.D.): For D.O.T. regulatory information, if required, consult transportation regulations, product shipping papers, or contact your Dow representative.

CANADIAN TDG INFORMATION: For TDG regulatory information, if required, consult transportation regulations, product shipping papers or contact your Dow representative.

15. REGULATORY INFORMATION (Not meant to be all-inclusive--selected regulations represented)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See other sections for health and safety information.

U.S. REGULATIONS

SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CAS NUMBER	CONCENTRATION
BIPHENYL	000092-52-4	27 %

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

(Continued on page 8 , over)

REGULATORY INFORMATION (CONTINUED)

A delayed health hazard

TOXIC SUBSTANCES CONTROL ACT (TSCA):

All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

The CAS number(s) for TSCA is(are):
000101-84-8 and 000092-52-4

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
BIPHENYL	000092-52-4	NJ3 NJ2 PA3 PA1
BENZENE, 1,1'-OXYBIS-	000101-84-8	NJ3 PA1

NJ3=New Jersey Workplace Hazardous Substance (present at greater than or equal to 1.0%).
PA3=Pennsylvania Environmental Hazardous Substance (present at greater than or equal to 1.0%).

OSHA HAZARD COMMUNICATION STANDARD:

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND):

This product contains the following substance(s) listed as "Hazardous Substances" under CERCLA which may require reporting of releases:

(Continued on page 9)

Product:DOWTHERM* A HEAT TRANSFER FLUID
Product Code: 25576

Effective Date: 04/28/03 Date Printed: 06/16/04 MSD: 000412

REGULATORY INFORMATION (CONTINUED)

Category:

Chemical Name	CAS#	RQ	% in Product
Biphenyl	000092-52-4	100	27

CANADIAN REGULATIONS

WHMIS INFORMATION: The Canadian Workplace Hazardous Materials Information System (WHMIS) Classification for this product is:

D2B - eye or skin irritant
Refer elsewhere in the MSDS for specific warnings and safe handling information. Refer to the employer's workplace education program.

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CPR STATEMENT: This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

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HAZARDOUS PRODUCTS ACT INFORMATION: This product contains the following ingredients which are Controlled Products and/or on the Ingredient Disclosure List (Canadian HPA section 13 and 14):

COMPONENTS:	CAS #	AMOUNT(%w/w)
DIPHENYL OXIDE (PHENYL ETHER)	000101-84-8	73%
BIPHENYL	000092-52-4	27%

16. OTHER INFORMATION

MSDS STATUS: Revised Section 3 and 4.

Material Safety Data Sheet

bp

1. Chemical product and company identification

Product name	ETHYLENE
MSDS#	0000000110
Historic MSDS#:	745514 (Erdoelchemie), 10001 (BP), 0000001147, 01255
Code	0000000110 (NAP)
Product use	Industrial use
Supplier	BP Amoco Chemical Company 150 West Warrenville Road Naperville, Illinois 60563-8460 USA Tel: 1 (877) 701-2726
EMERGENCY HEALTH INFORMATION:	1 (800) 447-8735 Outside the US: +1 703-527-3887 (CHEMTREC)
EMERGENCY SPILL INFORMATION:	1 (800) 424-9300 CHEMTREC (USA)
OTHER PRODUCT INFORMATION	1 (866) 4 BP - MSDS (866-427-6737 Toll Free - North America) email: bpcares@bp.com

2. Composition/information on ingredients

Ingredient name	CAS #	% by weight	Exposure limits
Ethylene	74-85-1	95 - 100	Simple asphyxiant.

3. Hazards identification

Physical state	Gas. (Liquefied gas)
Color	Colorless.
Emergency overview	WARNING! EXTREMELY FLAMMABLE LIQUID AND VAPOR. (Liquefied gas) VAPOR MAY CAUSE FLASH FIRE. AT VERY HIGH CONCENTRATIONS, CAN DISPLACE THE NORMAL AIR AND CAUSE SUFFOCATION FROM LACK OF OXYGEN. Extremely cold material; can cause burns similar to frostbite. Extremely hazardous liquid and vapor under pressure. Keep away from heat, sparks and flame. Do not puncture or incinerate container. Keep container closed. Use only with adequate ventilation. Do not breathe vapor or mist. Avoid contact with eyes, skin and clothing.
Routes of entry	Dermal contact. Eye contact. Inhalation.
Potential Health Effects	

Eyes	Extremely cold material; can cause burns similar to frostbite. Will cause serious damage to the eyes.
Skin	Extremely cold material; can cause burns similar to frostbite.
Inhalation	At very high concentrations, can displace the normal air and cause suffocation from lack of oxygen.
Ingestion	Not applicable (gas).
Medical conditions aggravated by overexposure:	None identified.

See toxicological Information (section 11)

4. First aid measures

Eye Contact	Contact with liquid: Immediately flush with plenty of tepid water (105-115 F; 41-46 C). DO NOT USE HOT WATER. Get immediate medical attention. Get medical attention immediately.
Skin Contact	Contact with liquid: Immediately flush with plenty of tepid water (105-115 F; 41-46 C). DO NOT USE HOT WATER. Get immediate medical attention. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion	Not applicable (gas).

5. Fire-fighting measures

Flammability of the product	Extremely flammable liquefied gas.
Auto-ignition temperature	425 °C
Flash point	-135 °C (Closed cup)
Explosion limits	Lower: 2.3 % Upper: 32.4 %
Products of combustion	These products are carbon oxides (CO, CO2) smokes as products of incomplete combustion.
Unusual fire/explosion hazards	This material is combustible/flammable and is sensitive to fire, heat, and static discharge. Highly explosive in presence of open flames, sparks and static discharge, of shocks, of heat, of oxidizing materials. Vapors may form explosive mixtures with air. Vapor may cause flash fire. Vapors may accumulate in low or confined areas, travel considerable distance to source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. Container explosion may occur under fire conditions or when heated.
Fire fighting media and instructions	In case of fire, use water fog, foam, dry chemicals, or carbon dioxide. DO NOT FIGHT FIRE WHEN IT REACHES MATERIAL. Withdraw from fire and let it burn. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. First move people out of line-of-sight of the scene and away from windows. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.
Protective clothing (fire)	Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

6. Accidental release measures

Personal Precautions

Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Do not touch or walk through spilled material. Follow all fire fighting procedures (Section 5). Use suitable protective equipment (Section 8). If possible, turn leaking container so that gas escapes rather than liquid. Let evaporate. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas. Vapors can travel to a source of ignition and flashback.

Personal protection in case of a large spill

Splash goggles. Full suit. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

7. Handling and storage

Handling

Avoid prolonged or repeated contact with skin. Avoid breathing vapors or spray mists. Use only with adequate ventilation. Keep away from heat, sparks and flame. To avoid fire, minimize ignition sources. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Extremely hazardous liquid and vapor under pressure. Do not puncture or incinerate container. Wash thoroughly after handling.

Storage

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

8. Exposure controls/personal protection

Occupational exposure limits

Ingredient name	Occupational exposure limits
Ethylene	Simple asphyxiant.

Control Measures

Use only in well-ventilated areas. Use explosion-proof ventilation equipment. Handle the material in a fume hood/cupboard or under local exhaust ventilation. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Hygiene measures

Wash hands, forearms, and face thoroughly after handling compounds and before eating, smoking, using lavatory, and at the end of day.

Personal protection

Eyes

Avoid contact with eyes. Chemical splash goggles. Face shield.

Skin and Body

Avoid contact with skin and clothing. Wear clothing and footwear that cannot be penetrated by chemicals or oil. Face shield.

Respiratory

Use only with adequate ventilation. If operating conditions cause high vapor concentrations or TLV is exceeded, use supplied-air respirator. Do not breathe vapor or mist.

Hands

Wear suitable gloves. (Insulated gloves suitable for low temperatures)

The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Feet

Appropriate protective footwear should be worn under normal conditions of use.

Consult your supervisor or S.O.P. for special handling directions

Consult local authorities for acceptable exposure limits.

9. Physical and chemical properties

Physical state	Gas. (Liquefied gas)
pH	Neutral.
Odor	Faint Odor. Sweet.
Color	Colorless.
Boiling point / Range	-104 °C
Melting point / Range	-169 °C
Specific Gravity	0.61
Density	570 kg/m^3 (0.6 g/cm^3) at -103.7°C 1.26kg/m^3 (0.126g/cm^3) at 0°C
Vapor pressure	42.7 Bar at 0°C
Vapor Density (Air = 1)	0.97
Solubility	Very slightly soluble in cold water.
LogK_{ow}	1.13
Viscosity	Dynamic: 0 Pa·s (0.2 cP) Kinematic: 0 mm^2/s (0 cSt) at -104°C

10. Stability and reactivity

Stability and Reactivity	Stable under recommended storage and handling conditions (see section 7).
Conditions to avoid	Keep away from heat, sparks and flame. Air/vapor mixtures may be explosive. May react in presence of moisture.
Incompatibility with various substances	Highly reactive with halogenated compounds,nitrogen oxides (NO, NO2...),oxidizing agents, strong acids.
Hazardous Decomposition Products	carbon oxides (CO, CO2) smokes as products of incomplete combustion.
Hazardous polymerization	Will not occur.

11. Toxicological information

Acute toxicity

This material is an asphyxiant. Asphyxiants may reduce the oxygen concentration in the air to dangerous levels. Symptoms of lack of oxygen include increased depth and frequency of breathing, air hunger, dizziness, headache, nausea or loss of consciousness.

Chronic toxicity

Carcinogenic effects	No component of this product at levels greater than or equal to 0.1% is identified as a carcinogen by ACGIH, the International Agency for Research on Cancer (IARC) or the European Commission (EC).
Mutagenic effects	No component of this product at levels greater than or equal to 0.1% is classified by established regulatory criteria as a mutagen.
Reproductive effects	No component of this product at levels greater than or equal to 0.1% is classified by established regulatory criteria as a reproductive toxin.

Teratogenic effects	No component of this product at levels greater than or equal to 0.1% is classified by established regulatory criteria as teratogenic or embryotoxic.
Other chronic toxicity data	This material is an asphyxiant. Asphyxiants may reduce the oxygen concentration in the air to dangerous levels. Symptoms of lack of oxygen include increased depth and frequency of breathing, air hunger, dizziness, headache, nausea or loss of consciousness.

12. Ecological information

Ecotoxicity	Ecological testing has not been conducted on this product by BP.
Persistence/degradability	This product is likely to volatize rapidly into the air because of its high vapor pressure. This product is not likely to partition to organic material in the environment because its Log (Kow) is: 1.13 . This product is not likely to move rapidly with surface or groundwater flows because of its low water solubility. <0.1%.
Mobility	This product is likely to volatize rapidly into the air because of its high vapor pressure. This product is not likely to partition to organic material in the environment because its Log (Kow) is: 1.13

13. Disposal considerations

Waste information

Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Dispose of in accordance with all applicable local and national regulations. Use only approved transporters, recyclers, treatment, storage or disposal facilities.

Empty containers may contain harmful, flammable/combustible or explosive residue or vapors. Do not cut, grind, drill, weld, reuse or dispose of containers unless adequate precautions are taken against these hazards.

Consult your local or regional authorities.

14. Transport information

International transport regulations

Regulatory Information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1038	Ethylene, refrigerated liquid	2.1	Not available.		Not available.
TDG Classification	UN1038	Ethylene, refrigerated liquid	2.1	Not available.		Not available.
IMDG Classification	UN1038	Ethylene, refrigerated liquid	2.1	Not available.		Not available.
						

IATA Classification	-----	Ethylene, refrigerated liquid	2.1	Not available.		RemarksCARGO AIRCRAFT ONLY: FORBIDDEN ON PASSENGER AIRCRAFT

Nonbulk Shipping Information

D O T Nonbulk Shipping Information	UN1962 Ethylene 2.1
T D G Nonbulk Shipping Information	UN1962 Ethylene 2.1

15. Regulatory information

U.S. Federal regulations

US INVENTORY (TSCA): Listed on inventory.

This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements	Ethylene	74-85-1	99.9 - 100
Supplier notification	Ethylene	74-85-1	99.9 - 100

CERCLA Sections 102a/103 Hazardous Substances (40 CFR Part 302.4):: This material is not regulated under CERCLA Sections 103 and 107.

State regulations

Massachusetts RTK:Ethylene
New Jersey:Ethylene
Pennsylvania RTK:Ethylene (environmental hazard, generic environmental hazard)

California prop. 65: No products were found.

Inventories

AUSTRALIAN INVENTORY (AICS): Listed on inventory.

CANADA INVENTORY (DSL): Listed on inventory.

CHINA INVENTORY (IECS): Listed on inventory.

EC INVENTORY (EINECS/ELINCS): Listed on inventory.

JAPAN INVENTORY (ENCS): Listed on inventory.

KOREA INVENTORY (ECL): Listed on inventory.

PHILIPPINE INVENTORY (PICCS): Listed on inventory.

16. Other information

Label Requirements

WARNING!

EXTREMELY FLAMMABLE LIQUID AND VAPOR. (Liquefied gas)
VAPOR MAY CAUSE FLASH FIRE.
AT VERY HIGH CONCENTRATIONS, CAN DISPLACE THE NORMAL AIR AND CAUSE SUFFOCATION FROM LACK OF OXYGEN.
Extremely cold material; can cause burns similar to frostbite.

HMIS® Rating :		
	Health	1
	Flammability	4
	Physical Hazard	2
	Personal protection	X

National Fire Protection Association (U.S.A.)

History

Date of issue 05/10/2004.

Date of previous issue No Previous Validation.

Prepared by Product Stewardship

Notice to reader

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This Material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

SAFETY DATA SHEET

1. Identification of the substance/preparation and of the company/undertaking

Product name	**METHYLENE CHLORIDE**
SDS #	0000001598
Supplier	BP Singapore Pte Ltd #01-01 BP Tower 396 Alexandra Road Singapore, 119954
EMERGENCY TELEPHONE NUMBER	+65 6371 8999
Other Information	Phone Number: +60 3 2059 5211 Fax Number: +60 3 2059 5645 e-mail: bpcares@bp.com

2. Composition/information on ingredients

Substance/Preparation Substance

Chemical name	CAS no.	%	EINECS / ELINCS.	Classification
Methylene chloride	75-09-2	100	200-838-9	Carc. Cat. 3; R40

See Section 16 for the full text of the R Phrases declared above

Occupational Exposure Limit(s), if available, are listed in Section 8

3. Hazards identification

This substance is classified as dangerous according to Directive 67/548/EEC as amended and adapted.

Physical/chemical Hazards	Not classified as dangerous.
Human health hazards	Limited evidence of a carcinogenic effect.
Environmental hazards	Not classified as dangerous.
Effects and symptoms	
Eyes	May cause eye irritation.
Skin	May cause cancer. May cause skin irritation.
Inhalation	May cause cancer. Exposure to vapour at high concentrations may have the following effects:-irritation of nose, throat and respiratory tract. May cause headache, weakness, dizziness, shortness of breath, cyanosis, rapid heart beat, unconsciousness and possible death. Repeated or prolonged exposure to the substance can produce kidney damage. Can cause liver damage if inhaled.
Ingestion	Aspiration hazard if swallowed -- harmful or fatal if liquid is aspirated into lungs. Ingestion may irritate the gastrointestinal tract and may cause nausea and vomiting. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.

4. First-aid measures

Eye Contact	In case of contact, immediately flush eyes with a copious amount of water for at least 15 minutes. Get medical attention if irritation occurs.
Skin contact	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention if irritation develops.
Inhalation	If inhaled, remove to fresh air. Get medical attention if symptoms appear.
Ingestion	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately.

5. Fire-fighting measures

Extinguishing Media	
Suitable	In case of fire, use water fog, foam, dry chemical or CO2 extinguisher or spray.
Hazardous decomposition products	These products are carbon oxides (CO, CO2), halogenated compounds, hydrogen chloride.
Unusual fire/explosion Hazards	This material is not explosive as defined by established regulatory criteria.
Protection of fire-fighters	Fire fighters should wear self-contained positive pressure breathing apparatus (SCBA) and full turnout gear. Fire-fighters' protective clothing will provide limited protection.

6. Accidental release measures

Personal Precautions	Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Follow all fire fighting procedures (Section 5).
Environmental precautions and cleanup methods	If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) scoop up material and place in a sealed, liquid-proof container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal. Minimize contact of spilled material with soils to prevent runoff to surface waterways. See Section 13 for Waste Disposal Information.
Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Vapour respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

7. Handling and storage

Handling	Avoid prolonged or repeated contact with skin. Avoid breathing vapours or spray mists. Wash thoroughly after handling. Aspiration hazard if swallowed- can enter lungs and cause damage. Do not ingest. If ingested do not induce vomiting.
Storage	Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store in: Aluminium. and its alloys

8. Exposure controls/personal protection

Ingredient Name	**Occupational Exposure Limits**
Methylene chloride	**ACGIH TLV (United States, 2002). Notes: Substance identified by other sources as a suspected or confirmed human carcinogen. 1996 Adoption Substances for which the TLV is higher than the OSHA Permissible Exposure Limit (PEL) and/or the NIOSH Recommended Exposure Limit (REL). See CFR 58(124) :3 6338-33351, June 30, 1993, for revised OSHA PEL. Refers to Appendix A -- Carcinogens.** TWA: 174 mg/m^3 8 hour(s). TWA: 50 ppm 8 hour(s).

Control Measures	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are close to the workstation location.
Hygiene measures	Wash hands after handling compounds and before eating, smoking, using lavatory, and at the end of day.
Personal protective equipment	
Respiratory system	Use only with adequate ventilation. Do not breathe vapour or mist.
Skin and body	Avoid contact with skin. Wear clothing and footwear that cannot be penetrated by chemicals or oil.
Hands	Wear gloves that cannot be penetrated by chemicals or oil. (Nitrile gloves.) The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.
Eyes	Chemical splash goggles.

9. Physical and chemical properties

Flash point	None.
Colour	Colourless.
Odour	Ethereal. (Strong.)
Odour threshold	
Physical state	Liquid.
Boiling point / range	40°C
Melting point / range	-97°C
Density	1326 kg/m^3 (1.3 g/cm^3) at 20°C
Vapour density (Air = 1)	2.93
Vapour pressure	47 at 20°C. 71 at 30°C
Solubility	Easily soluble in cold water.
Viscosity	kinematic: 0.3 mm^2/s (0.3 cSt) at 20°C

10. Stability and reactivity

Conditions to Avoid	High temperatures
Incompatibility with Various Substances	Nitric acid. Strong oxidizing agents. Amines. Aluminium. Nitrogen oxide Hazardous Decomposition Products: carbon oxides (CO, CO2), hydrogen chloride. Phosgene Gas. Toxic fumes
Hazardous Polymerization	Will not occur.

11. Toxicological information

Chronic toxicity

Carcinogenic effects

SUSPECT CANCER HAZARD.
MAY CAUSE CANCER. Risk of cancer depends on duration and level of exposure. Classified + (Proven.) by OSHA [Methylene chloride]. Classified A3 (Proven for animals.) by ACGIH, 2B (Possible for humans.) by IARC, 3 (Possible for humans.) by European Union [Methylene chloride]. Classified 2 (Reasonably Anticipated To Be Human Carcinogens.) by NTP [Methylene chloride].
Aspiration of this product into the lungs may cause chemical pneumonia and can be fatal. Aspiration into the lungs can occur while vomiting after ingestion of this product. Do not siphon by mouth.

12. Ecological information

Mobility	If released to water the product will sink. Partially soluble in water
Environmental hazards	Not classified as dangerous.

13. Disposal considerations

Disposal Consideration / Waste information	Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if state or federal regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Comply with all federal, state and local laws pertaining to waste management.
Hazardous Waste	The classification of the product may meet the criteria for a hazardous waste

14. Transport information

International transport regulations

Regulatory Information	UN number	Proper shipping name	Class	Packing group	Label	Additional Information
ADR/RID Classification	UN 1593	Dichloromethane	6.1	III	Not determined.	**CEFIC Tremcard 61S1593** **UK Emergency Action Code:** **Not available.**

IMDG Classification	UN 1593	Dichloromethane	6.1	III	Not determined.	**Emergency Schedules (EmS)** F-A, S-A
IATA Classification	UN 1593	Dichloromethane	6.1	III	Not determined.	-

15. Regulatory information

Label Requirements

Hazard symbol(s)

Risk Phrases R40- Limited evidence of a carcinogenic effect.

Safety Phrases
S2- Keep out of the reach of children.
S23- Do not breathe gas/fumes/vapour/spray
S24/25- Avoid contact with skin and eyes.
S36/37- Wear suitable protective clothing and gloves.
S46- If swallowed, seek medical advice immediately and show this container or label.

Contains Methylene chloride 200-838-9

EU Regulations Classification and labeling have been performed according to EU directives 1999/45/EC and 67/548/EEC as amended and adapted.

Other Regulations

Inventories

AUSTRALIAN INVENTORY (AICS): Please contact BP for information on the inventory status of this material.
North America: Tel.: Toll free 1 (866) 4 BP-MSDS (866-427-6737) Outside of North America: +1-630-420-5158 e-mail: bpcares@bp.com

CANADA INVENTORY (DSL): Please contact BP for information on the inventory status of this material.
North America: Tel.: Toll free 1 (866) 4 BP-MSDS (866-427-6737) Outside of North America: +1-630-420-5158 e-mail: bpcares@bp.com

CHINA INVENTORY (IECS): Please contact BP for information on the inventory status of this material.
North America: Tel.: Toll free 1 (866) 4 BP-MSDS (866-427-6737) Outside of North America: +1-630-420-5158 e-mail: bpcares@bp.com

EC INVENTORY (EINECS): Please contact BP for information on the inventory status of this material.
North America: Tel.: Toll free 1 (866) 4 BP-MSDS (866-427-6737) Outside of North America: +1-630-420-5158 e-mail: bpcares@bp.com

JAPAN INVENTORY (ENCS): Please contact BP for information on the inventory status of this material.
North America: Tel.: Toll free 1 (866) 4 BP-MSDS (866-427-6737) Outside of North America: +1-630-420-5158 e-mail: bpcares@bp.com

KOREA INVENTORY (ECL): Please contact BP for information on the inventory status of this material.
North America: Tel.: Toll free 1 (866) 4 BP-MSDS (866-427-6737) Outside of North America: +1-630-420-5158 e-mail: bpcares@bp.com

PHILIPPINE INVENTORY (PICCS): Please contact BP for information on the inventory status of this material.
North America: Tel.: Toll free 1 (866) 4 BP-MSDS (866-427-6737) Outside of North America: +1-630-420-5158 e-mail: bpcares@bp.com

US INVENTORY (TSCA): Please contact BP for information on the inventory status of this material.
North America: Tel.: Toll free 1 (866) 4 BP-MSDS (866-427-6737) Outside of North America: +1-630-420-5158 e-mail: bpcares@bp.com

National regulations

Additional Information

16. Other information

Full text of R-phrases appearing in section 2 *R40- Limited evidence of a carcinogenic effect.*

HISTORY

Date of issue 12/3/2003.

Date of previous issue 9/12/2003.

Prepared by Product Stewardship

Notice to Reader

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Material Safety Data Sheet

1. Chemical Product and Company Identification

Product name	SODIUM ALUMINATE SOLUTION
MSDS#	0000000658
Historic MSDS#:	11985 (Amoco)
Supplier	BP Amoco Chemical Company 150 West Warrenville Road Naperville, Illinois 60563-8460 USA Tel: 1 (877) 701-2726
EMERGENCY HEALTH INFORMATION:	1 (800) 447-8735
EMERGENCY SPILL INFORMATION:	1 (800) 424-9300 CHEMTREC (USA)
OTHER PRODUCT INFORMATION	1 (866) 4 BP - MSDS (866-427-6737 Toll Free - North America) email: bpcares@bp.com

2. Composition / information on ingredients

Ingredient Name	CAS #	% by Weight	Exposure Limits
SODIUM OXIDE	1313-59-3	13-25	None assigned.
ALUMINATE (ALO2), SODIUM	1302-42-7		None assigned.
ALUMINUM OXIDE	1344-28-1	5-15	**ACGIH TLV (United States, 2000).** TWA: 10 mg/m^3 **OSHA PEL (United States, 1971).** TWA: 5 MGM3 Form: Respirable fraction TWA: 15 MGM3 Form: Total dust
SODIUM HYDROXIDE	1310-73-2	<5	**ACGIH TLV (United States, 2000).** CEIL: 2 mg/m^3 **OSHA PEL (United States, 1971).** TWA: 2 MGM3
WATER	7732-18-5	45-76	None assigned.

3. Hazards identification

Physical state Liquid.

Color Straw color. (Light.)

Emergency Overview DANGER! CORROSIVE.

Causes eye damage.
Causes skin burns.
Causes respiratory tract burns.
Causes severe irritation or burns of the mouth, throat, and esophagus.

Do not get in eyes, on skin or clothing. Avoid breathing vapor or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.

Routes of Entry Skin Contact. Eye contact. Inhalation. Ingestion.

POTENTIAL HEALTH EFFECTS

Eyes Corrosive. Causes eye damage.

Skin Corrosive. Causes skin burns.

Inhalation Causes respiratory tract burns.

Ingestion Causes severe irritation or burns of the mouth, throat, and esophagus.

See Toxicological Information (section 11)

4. First-aid measures

Eye Contact	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
Skin Contact	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

5. Fire-fighting measures

Flammability of the Product	Non-flammable.
Products of Combustion	Not applicable.
Unusual fire/explosion hazards	Non-flammable.
	This material is not explosive as defined by established regulatory criteria.
Fire Fighting Media and Instructions	Not applicable.
Protective Clothing (Fire)	Not applicable.

6. Accidental release measures

Personal Precautions	Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (Section 8).
Environmental Precautions and Clean-up Methods	If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) scoop up material and place in a sealed, liquid-proof container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal. Minimize contact of spilled material with soils to prevent runoff to surface waterways. See Section 13 for Waste Disposal Information.
Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

7. Handling and storage

Handling	Do not get in eyes, on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.
Storage	Keep container tightly closed. Keep container in a cool, well-ventilated area.

8. Exposure controls/personal protection

Occupational Exposure Limits

Ingredient Name	Occupational Exposure Limits
ALUMINUM OXIDE	**ACGIH TLV (United States, 2001).** TWA: 10 mg/m^3 8 hour(s). **OSHA PEL (United States, 1971).** TWA: 5 MGM3 8 hour(s). Form: Respirable fraction TWA: 15 MGM3 8 hour(s). Form: Total dust
SODIUM HYDROXIDE	**ACGIH TLV (United States, 2001).** CEIL: 2 mg/m^3 **OSHA PEL (United States, 1971).** TWA: 2 MGM3 8 hour(s).

Control Measures	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.
Hygiene measures	Wash hands after handling compounds and before eating, smoking, using lavatory, and at the end of day.
Personal Protection	
Eyes	Do not get in eyes. Wear face shield. Chemical splash goggles.

Skin and Body	Do not get on skin or clothing. Wear clothing and footwear that cannot be penetrated by chemicals or oil. Wear face shield.
Respiratory	Use only with adequate ventilation. Avoid breathing vapor or mist. If ventilation is inadequate, use respirator that will protect against organic vapor and dust/mist.
Hands	Wear gloves that cannot be penetrated by chemicals or oil. (Neoprene gloves.) The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions. Consult your supervisor or S.O.P. for special handling directions

Consult local authorities for acceptable exposure limits.

9. Physical and chemical properties

Physical state	Liquid.
pH	10 to 14 (Basic.)
Odor	Odorless.
Color	Straw color. (Light.)
Boiling Point / range	102 °C
Specific Gravity	1.1
Vapor Pressure	2.9 kPa (21.9 mmHg) (at 25°C)
Solubility	Soluble in Water
Dispersion Properties	See solubility in water.

10. Stability and reactivity

Stability and Reactivity	The product is stable.
Conditions to avoid	Avoid inhalation of vapors and spray mist.
Incompatibility with Various Substances	Reactive with oxidizing agents, metals, acids.
Hazardous Decomposition Products	Not applicable.
Hazardous Polymerization	Will not occur.

11. Toxicological information

Chronic toxicity

Carcinogenic Effects	No component of this product at levels greater than 0.1% is identified as a carcinogen by ACGIH or the International Agency for Research on Cancer (IARC). No component of this product present at levels greater than 0.1% is identified as a carcinogen by the U.S. National Toxicology Program (NTP) or the U.S. Occupational Safety and Health Act (OSHA).
Mutagenic Effects	No component of this product at levels greater than 0.1% is classified by established regulatory criteria as a mutagen.
Reproductive Effects	No component of this product at levels greater than 0.1% is classified by established regulatory criteria as a reproductive toxin.
Teratogenic effects	No component of this product at levels greater than 0.1% is classified by established regulatory criteria as teratogenic or embryotoxic.
Other chronic toxicity data	Not available.

12. Ecological information

Ecotoxicity Ecological testing has not been conducted on this product by BP.

Mobility This product may move with surface or groundwater flows because its water solubility is: > 1000 ppm. This product is likely to volatize rapidly into the air because of its high vapor pressure.

13. Disposal considerations

Waste Information Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Dispose of in accordance with all applicable local and national regulations.

Empty containers or liners may retain some product residues.

Consult your local or regional authorities.

14. Transport information

International transport regulations

Regulatory Information	UN number	Proper shipping name	Class	Packing Group	Label	Additional information
DOT Classification	UN3266	Corrosive liquid, basic, inorganic, n.o.s. (SODIUM ALUMINATE, SOLUTION)	8	II	Not determined.	**Packaging Instruction** **Passenger Aircraft** **Quantity limitation: 1 L** **Cargo Aircraft** **Quantity limitation: 30 L**
TDG Classification	UN3266	Corrosive liquid, basic, inorganic, n.o.s. (SODIUM ALUMINATE, SOLUTION)	8	II	Not determined.	-
IMDG Classification	UN3266	Corrosive liquid, basic, inorganic, n.o.s. (SODIUM ALUMINATE, SOLUTION)	8	II	Not determined.	**Emergency Schedules (EmS)** **8-15**
IATA Classification	UN3266	Corrosive liquid, basic, inorganic, n.o.s. (SODIUM ALUMINATE, SOLUTION)	8	II	Not determined.	-

15. Regulatory information

U.S. Federal Regulations US INVENTORY (TSCA): In compliance.

SARA Title III Section 302 Extremely Hazardous Substances (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.
SARA Title III Sections 311/312 Hazardous Categorization (40 CFR Part 370): SODIUM OXIDE: Immediate (Acute) Health Hazard; ALUMINUM OXIDE: Immediate (Acute) Health Hazard; SODIUM HYDROXIDE: Immediate (Acute) Health Hazard

SARA 313 toxic chemical notification and release reporting: ALUMINUM OXIDE 10%

CERCLA Sections 102a/103 Hazardous Substances (40 CFR Part 302.4): SODIUM HYDROXIDE: 1000 lbs. (453.6 kg);

State Regulations Pennsylvania RTK: ALUMINUM OXIDE: (environmental hazard, generic environmental hazard); SODIUM HYDROXIDE: (environmental hazard, generic environmental hazard)
Massachusetts RTK: ALUMINUM OXIDE; SODIUM HYDROXIDE
New Jersey: ALUMINUM OXIDE; SODIUM HYDROXIDE

California prop. 65: No products were found.

Inventories	AUSTRALIAN INVENTORY (AICS): In compliance.
	CANADA INVENTORY (DSL): In compliance.
	CHINA INVENTORY (IECS): In compliance.
	EC INVENTORY (EINECS): In compliance.
	JAPAN INVENTORY (ENCS): In compliance.
	KOREA INVENTORY (ECL): In compliance.
	PHILIPPINE INVENTORY (PICCS): In compliance.

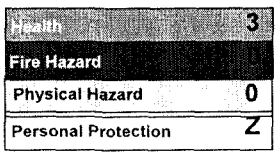
16. Other information

Label Requirements

DANGER! CORROSIVE.

Causes eye damage.
Causes skin burns.
Causes respiratory tract burns.
Causes severe irritation or burns of the mouth, throat, and esophagus.

Hazardous Material Information System (U.S.A.)



National Fire Protection *Association* (U.S.A.)

HISTORY

Date of issue	11/11/2002.
Date of Previous Issue	3/27/2002.
Prepared by	Product Stewardship

Notice to Reader

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Product Information

DOWTHERM A

Synthetic Organic Heat Transfer Fluid—Liquid and Vapor Phase Data

DOWTHERM* A heat transfer fluid is a eutectic mixture of two very stable compounds, biphenyl ($C_{12}H_{10}$) and diphenyl oxide ($C_{12}H_{10}O$). These compounds have practically the same vapor pressures, so the mixture can be handled as if it were a single compound. DOWTHERM A fluid may be used in systems employing either liquid phase or vapor phase heating.

Recommended use temperature range:
Liquid phase: 15°C (60°F) to 400°C (750°F)
Vapor phase: 257°C (495°F) to 400°C (750°F)

Suitable applications: *Indirect heat transfer*

For health and safety information for this product, contact your Dow sales representative or call the number for your area on the second page of this sheet for a Material Safety Data Sheet (MSDS).

Typical Properties of DOWTHERM A Fluid†

Composition: Diphenyl Oxide/Biphenyl Blend

Color: Clear to Light Yellow

Property	SI Units	English Units
Freeze Point	12.0°C	53.6°F
Atmospheric Boiling Point	257.1°C	494.8°F
Flash Point[1]	113°C	236°F
Fire Point[2]	118°C	245°F
Autoignition Temperature[3]	599°C	1110°F
Density @ 25°C (75°F)	1056 kg/m³	66.0 lb/ft³
Surface Tension in Air @		
20°C (68°F)	40.1 Dynes/cm	40.1 Dynes/cm
40°C (104°F)	37.6 Dynes/cm	37.6 Dynes/cm
60°C (140°F)	35.7 Dynes/cm	35.7 Dynes/cm
Estimated Critical Temperature	497°C	927°F
Estimated Critical Pressure	31.34 bar	30.93 atm
Estimated Critical Volume	3.17 l/kg	0.0508 ft³/lb
Average Molecular Weight		166.0
Heat of Combustion	36,053 kJ/kg	15,500 Btu/lb

† Not to be construed as specifications
[1] SETA
[2] C.O.C.
[3] ASTM E659-78

Saturated Liquid Properties of DOWTHERM A Fluid (SI units)

Temp. °C	Vapor Pressure bar	Viscosity mPa sec	Specific Heat kJ/kg K	Thermal Cond. W/mK	Density kg/m³
15	0.00	5.00	1.558	0.1395	1063.5
65	0.00	1.58	1.701	0.1315	1023.7
105	0.01	0.91	1.814	0.1251	990.7
155	0.06	0.56	1.954	0.1171	947.8
205	0.28	0.38	2.093	0.1091	902.5
255	0.97	0.27	2.231	0.1011	854.0
305	2.60	0.20	2.373	0.0931	801.3
355	5.80	0.16	2.527	0.0851	742.3
405	11.32	0.12	2.725	0.0771	672.5

Saturated Liquid Properties of DOWTHERM A Fluid (English units)

Temp. °F	Vapor Pressure psia	Viscosity cP	Specific Heat Btu/lb °F	Thermal Cond. Btu/hr ft²(°F/ft)	Density lb/ft³
60	0.000	4.91	0.373	0.0805	66.37
120	0.003	2.12	0.396	0.0775	64.72
180	0.028	1.22	0.418	0.0744	63.03
240	0.16	0.81	0.441	0.0713	61.30
300	0.64	0.59	0.463	0.0682	59.51
360	2.03	0.45	0.485	0.0651	57.65
420	5.38	0.35	0.507	0.0620	55.72
480	12.25	0.28	0.529	0.0590	53.70
540	24.72	0.23	0.552	0.0559	51.57
600	45.31	0.19	0.575	0.0528	49.29
660	76.89	0.16	0.599	0.0497	46.82
720	122.7	0.14	0.627	0.0466	44.08
780	186.4	0.12	0.665	0.0436	40.93

DOWTHERM A
Synthetic Organic
Heat Transfer Fluid

Saturated Vapor Properties of DOWTHERM A Fluid (SI Units)

Temp. °C	Vapor Pressure bar	Liquid Enthalpy kJ/kg	Latent Heat kJ/kg	Vapor Enthalpy kJ/kg	Vapor Density kg/m^3	Vapor Viscosity mPa·s	Vapor Thermal Cond. W/mK	Z_{vapor}	Specific Heat (c_p) kJ/kg K	Ratio of Specific Heats c_p/c_v
15	0.00	4.9	407.2	412.1		0.0054	0.0075	1.000	1.044	1.050
65	0.00	88.1	380.9	469.1	0.0040	0.0063	0.0104	1.000	1.227	1.043
105	0.01	158.1	362.7	520.9	0.0341	0.0071	0.0129	0.999	1.366	1.038
155	0.06	251.2	341.5	592.7	0.2583	0.0080	0.0163	0.995	1.528	1.035
205	0.28	351.2	320.2	671.5	1.179	0.0090	0.0200	0.982	1.681	1.034
255	0.97	458.2	297.4	755.6	3.831	0.0100	0.0238	0.954	1.829	1.036
305	2.60	572.2	271.5	843.6	9.896	0.0110	0.0279	0.908	1.976	1.042
355	5.80	693.1	240.6	933.8	22.03	0.0122	0.0322	0.838	2.133	1.057
405	11.32	822.0	201.7	1023.7	45.17	0.0138	0.0368	0.740	2.333	1.094

Saturated Vapor Properties of DOWTHERM A Fluid (English Units)

Temp. °F	Vapor Pressure psia	Liquid Enthalpy Btu/lb	Latent Heat Btu/lb	Vapor Enthalpy Btu/lb	Vapor Density lb/ft^3	Vapor Viscosity cP	Vapor Thermal Cond. Btu/hr ft^2(°F/ft)	Z_{vapor}	Specific Heat (c_p) Btu/lb °F	Ratio of Specific Heats c_p/c_v
60	0.000	2.5	175.1	177.6		0.0054	0.0044	1.000	0.250	1.050
120	0.003	26.2	167.3	193.5		0.0060	0.0055	1.000	0.279	1.045
300	0.64	103.0	148.0	251.1	0.0130	0.0079	0.0092	0.996	0.361	1.035
360	2.03	131.1	142.0	273.1	0.0388	0.0086	0.0106	0.989	0.385	1.034
420	5.38	160.6	135.8	296.3	0.0967	0.0092	0.0120	0.977	0.409	1.034
480	12.25	191.4	129.2	320.5	0.2100	0.0098	0.0135	0.959	0.433	1.035
540	24.72	223.5	122.1	345.5	0.4102	0.0105	0.0150	0.932	0.456	1.039
600	45.31	256.9	114.2	371.1	0.7389	0.0113	0.0166	0.895	0.480	1.045
660	76.89	291.7	105.3	397.0	1.254	0.0121	0.0183	0.848	0.505	1.055
720	122.7	327.9	95.0	422.9	2.045	0.0130	0.0200	0.789	0.534	1.073
780	186.4	365.9	82.5	448.4	3.270	0.0142	0.0219	0.714	0.571	1.108

For further information, call...

In the United States and Canada: 1-800-447-4369 • FAX: 1-989-832-1465

In Europe: +32 3 450 2240 • FAX: +32 3 450 2815

In the Pacific: +886 22 547 8731 • FAX: +886 22 713 0092

In other Global Areas: 1-989-832-1560 • FAX: 1-989-832-1465

www.dowtherm.com

Published November 2001

NA/LA/Pacific: Form No. 176-01463-1101 AMS
Europe: CH-153-307-E-1101

Material Safety Data Sheet

innovene

1. Chemical product and company identification

Product name	C1618 Alcohol / C12 LAO Mixture
MSDS #	0000002079
Historic MSDS #:	None.
Code	0000002079 (NAP)
Supplier	Innovene USA LLC 200 E. Randolph Drive Chicago, IL 60606
Emergency phone:	1 (800) 424-9300 Outside the US: +1 703-527-3887 (CHEMTREC)
OTHER PRODUCT INFORMATION	1 (888) 260-6737 Toll free - North America email:MSDS@innovene.com

2. Composition/information on ingredients

Ingredient name	CAS #	% by weight
1-DODECENE	112-41-4	0-50
ALCOHOLS, C16-18	67762-27-0	100
Contains:		
1-hexadecanol	36653-82-4	25 - 65
1-octadecanol	112-92-5	15-45
1-eicosanol	629-96-9	0-5
myristic alcohol	112-72-1	0-2

3. Hazards identification

Physical state	Solid.
Color	White.
Emergency overview	CAUTION! May cause eye irritation. May be combustible. Avoid prolonged contact with eyes, skin, and clothing. Wash thoroughly after handling.
Routes of entry	Dermal contact. Eye contact. Inhalation. Ingestion.
Potential health effects	
Eyes	May cause eye irritation.
Skin	Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis.
Inhalation	May cause respiratory tract irritation. Inhalation may cause headaches, dizziness, drowsiness, and nausea.
Ingestion	Prolonged exposure may lead to changes in liver function.
Medical conditions aggravated by over-exposure	None identified.

See toxicological information (section 11)

4. First aid measures

Eye contact	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
Skin contact	Immediately wash exposed skin with soap and water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Inhalation	If inhaled, remove to fresh air. Get medical attention if symptoms appear.
Ingestion	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention if symptoms appear.

5. Fire-fighting measures

Flammability of the product	May be combustible.
Flash point	77 °C (171°F) (Closed cup) Pensky-Martens.
Products of combustion	These products are carbon oxides (CO, CO_2).
Unusual fire/explosion hazards	This material is not explosive as defined by established regulatory criteria.
Fire-fighting media and instructions	In case of fire, use water spray (fog), foam or dry chemicals. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.
Protective clothing (fire)	Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

6. Accidental release measures

Personal precautions	Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (See Section: "Exposure controls/personal protection"). Follow all fire fighting procedures (See Section: "Fire-fighting measures").
Environmental precautions and clean-up methods	If emergency personnel are unavailable, carefully scoop up spilled materials and use a non-sparking or explosion proof means to transfer material to an appropriate container for disposal by incineration. Avoid contact of spilled material with soil and prevent runoff entering surface waterways. See Section 13 for Waste Disposal Information.
Personal protection in case of a large spill	Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

7. Handling and storage

Handling	Avoid prolonged or repeated contact with skin. Avoid prolonged contact with eyes, skin, and clothing. Eliminate all ignition sources. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Wash thoroughly after handling.
Storage	Keep container tightly closed. Store in a cool, well-ventilated area away from incompatible materials and ignition sources. Empty containers may contain harmful, flammable/combustible or explosive residue or vapors. Do not cut, grind, drill, weld, reuse or dispose of containers unless adequate precautions are taken against these hazards.

8. Exposure controls/personal protection

Occupational exposure limits

Ingredient name	Occupational exposure limits
1-DODECENE	None assigned.
ALCOHOLS, C16-18	None assigned.
Contains:	
1-hexadecanol	None assigned.
1-octadecanol	None assigned.
1-eicosanol	None assigned.
myristic alcohol	None assigned.

Control Measures If user operations generate dust, fumes, vapor or mist, use process enclosures, local exhaust ventilation, or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Hygiene measures Wash hands after handling compounds and before eating, smoking, using lavatory, and at the end of day.

Personal protection

Eyes Safety glasses with side shields or chemical goggles.

Skin and body Avoid prolonged or repeated contact with skin. Wear suitable protective clothing.

Respiratory Use with adequate ventilation. Avoid breathing vapor or mist.
If ventilation is inadequate, use respirator that will protect against organic vapor and dust/mist.

Hands None required; however, use of gloves is good industrial practice.

The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Consult your supervisor or S.O.P. for special handling directions

Consult local authorities for acceptable exposure limits.

9. Physical and chemical properties

Physical state Solid.

Odor Sweetish.

Color White.

Solubility Insoluble in cold water.

Dispersibility properties Is not dispersed in cold water.

10. Stability and reactivity

Stability and reactivity The product is stable.

Conditions to avoid Keep away from heat, sparks and flame.

Incompatibility with various substances May react or be incompatible with oxidizing materials.

Hazardous decomposition products carbon oxides (CO, CO_2)

Hazardous polymerization Will not occur.

11. Toxicological information

Ingredient name	Test	Result	Route	Species
ALCOHOLS, C16-18	LD50	>10000 mg/kg	Oral	Rat
	LD50	10000 mg/kg	Dermal	Rabbit
	LC50	>3.2 mg/l (8 hour (s))	Inhalation	Rat

Chronic toxicity

Carcinogenic effects No component of this product at levels greater than 0.1% is identified as a carcinogen by ACGIH or the International Agency for Research on Cancer (IARC). No component of this product present at levels greater than 0.1% is identified as a carcinogen by the U.S. National Toxicology Program (NTP) or the U.S. Occupational Safety and Health Act (OSHA).

Mutagenic effects No component of this product at levels greater than 0.1% is classified by established regulatory criteria as a mutagen.

Reproductive effects No component of this product at levels greater than 0.1% is classified by established regulatory criteria as a reproductive toxin.

Teratogenic effects No component of this product at levels greater than 0.1% is classified by established regulatory criteria as teratogenic or embryotoxic.

12. Ecological information

Ecotoxicity No testing has been performed by the manufacturer.

13. Disposal considerations

Waste information Dispose of in accordance with local, state and federal regulations. Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities.

Consult your local or regional authorities.

14. Transport information

International transport regulations

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1325	Flammable solid, organic, n.o.s. (1-DODECENE, 1-hexadecanol)	4.1	II	----	-----
TDG Classification	UN1325	Flammable solid, organic, n.o.s. (1-DODECENE, 1-hexadecanol)	4.1	II	----	-----
IMDG Classification	Not determined.	Not determined.	Not determined.	Not determined.	----	Not determined.
IATA Classification	Not determined.	Not determined.	Not determined.	Not determined.	----	Not determined.

15. Regulatory information

U.S. Federal regulations

US INVENTORY (TSCA): In compliance.

This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA 311/312 MSDS distribution - chemical inventory - hazard identification: 1-octadecanol: Immediate (Acute) Health Hazard

SARA 313

Form R - Reporting requirements

This product does not contain any hazardous ingredients at or above regulated thresholds.

Supplier notification

This product does not contain any hazardous ingredients at or above regulated thresholds.

CERCLA Sections 102a/103 Hazardous Substances (40 CFR Part 302.4):: This material is not regulated under CERCLA Sections 103 and 107.

State regulations

No products were found.

California Prop 65: No products were found

Inventories

AUSTRALIAN INVENTORY (AICS): In compliance.

CANADA INVENTORY (DSL): In compliance.

CHINA INVENTORY (IECS): In compliance.

EC INVENTORY (EINECS/ELINCS): In compliance.

JAPAN INVENTORY (ENCS): In compliance.

KOREA INVENTORY (ECL): In compliance.

PHILIPPINE INVENTORY (PICCS): In compliance.

16. Other information

Label requirements

CAUTION!

May cause eye irritation.
May be combustible.

HMIS® Rating :

Health	**1**
Flammability	**1**
Physical Hazard	**0**
Personal protection	**X**

National Fire Protection Association (U.S.A.)

History

Date of issue 09/06/2005.

Date of previous issue No Previous Validation.

Prepared by Product Stewardship

Notice to reader

NOTICE : This Material Safety Data Sheet is based upon data considered to be accurate at the time of its preparation. Despite our efforts, it may not be up to date or applicable to the circumstances of any particular case. We are not responsible for any damage or injury resulting from abnormal use, from any failure to follow appropriate practices or from hazards inherent in the nature of the product.

BP - Pasadena DOT Exemption Application

Required Information for Requesting an Exemption under 49 CFR Subpart B- Exemptions

Each application for an exemption or modification of an exemption must--

1. Be submitted in duplicate and, for timely consideration, at least 120 days before the requested effective date to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Admin., U.S. Department of Transportation, 400 7th Street, SW., Washington, D.C. 20590-0001, Attention: DHM-31.

The requested information was submitted via email, at the request of Ann Mazzullo, DOT Technical Specialist, on September 15, 2005. This date is 127 days from the requested effective date of January 20, 2006.

2. State the name, street, mailing address, telephone number of the applicant; or an individual designated as an agent of the applicant.

Applicant:
BP Amoco Chemical Company
1500 North South Street
P.O. Box 2016
Pasadena, Texas 77501-2016

Agent of the Applicant:
Bruce Handley
The Benham Companies LLC
9800 Richmond Avenue, Suite 590
Houston, Texas 77042-4634
Work: 832.252.1144
Mobile: 713.703.7244

3. If the applicant is not a resident of the United States, the applicant must designate an agent for service in accordance with 49 CFR 107.7.

The applicant is a U.S. corporation.

4. For a manufacturing exemption, one must provide a statement of the name and street address of each facility where manufacturing under the exemption will occur.

This application is for a non-manufacturing exemption.

5. If confidential treatment is requested, the applicant must comply with 49 CFR107.5(a).

Confidential treatment is not requested.

6. State the citation(s) of the specific regulation from which relief is sought.

Relief is sought from 49 CFR § 173.240 in that a non-DOT specification pressure vessel (Stainless steel and/or carbon steel heat exchanger) is not authorized for transportation. Relief is also sought from 49 CFR § 172.302 (c) pertaining to marking requirements.

7. Specify the proposed mode or modes of transportation.

Specialized motor vehicle owned and operated by Dunn Heat Exchangers, Texas City, Texas, the destination facility. See attached photograph of the transporting vehicle type. Each vehicle has a steel-containment pan and ribbed tarp cover to protect exchangers from rainfall.

8. Provide a detailed description of the proposed exemption (e.g., alternative packaging, test, procedure or activity) including, as appropriate, written descriptions, drawings, flowcharts, plans and other supporting documents.

The proposed exemption is generally similar to that granted to KRATON Polymers U.S. LLC under exemption DOT-E 12855 expiring on November 30, 2005. This application, if granted, would authorize one-way transportation of non-DOT specification pressure vessels (stainless steel, carbon steel, and brass heat exchangers) containing the residue of a Class III material by highway motor vehicle.

The main differences between the exemption applied for in this request and that granted in

DOT-E 12855 are the following:

1.) Point of shipment – This application is for heat exchangers originating in Pasadena, Texas.

2.) Type of exemption – The initial KRATON exemption was an emergency application for transportation of two (2) exchangers containing potentially hazardous materials for cleaning and return to service in Belpre, OH.
In contrast, this application is for the one-way shipment of approximately 118 purged and cleaned exchangers from Pasadena, Texas to Dunn Heat Exchangers of Texas City, Texas, for metals reclamation.
3.) The type of specific chemicals in service. BP will ship similar classes of compounds but the specific compounds differ between KRATON and this application.

Exemption 12855 contains detailed requirements for the grantee, specifically those included in sections 7 through 12. BP has reviewed all of these requirements and proposes to conduct the transportation of its heat exchangers in a manner that offers an equal or greater degree of safety through control measures.

9. Specify the proposed duration or schedule of events for which the exemption is sought.

The duration for which the exemption is sought is January 20, 2006 through December 31, 2006.

10. Provide a statement outlining the applicant's basis for seeking relief from compliance with the specified regulations and, if the exemption is requested for a fixed period, a description of how compliance will be achieved at the end of that period.

BP is decommissioning some of their assets in their Pasadena, Texas, facility. The removal of some chemical process equipment related to the formulation of Linear Alpha Olefins (LAOs) has resulted in the need to remove and reclaim the metal from the heat exchangers used in that process.

BP is seeking relief from compliance with the specified regulations since the materials of construction and packaging integrity of the heat exchangers provides a high degree of safety and are at least as protective as an authorized DOT container.

The exemption is requested for a fixed period from January 20, 2006 to December 31, 2006. BP does not anticipate decommissioning activities to extend past the expiration date, but should additional heat exchangers need to be sent off for metals reclamation after that date, BP will take appropriate steps to apply for an extension (revision) of the exemption in sufficient time to ensure compliance after December 31, 2006.

11. If an emergency exemption is requested, the applicant must comply with 49 CFR 107.117 and provide a statement of supporting facts and reasons.

This is not an emergency exemption.

12. Identify and describe the hazardous materials planned for transportation under the exemption.

The hazardous materials planned for transportation consist of the residues of Class III materials described as:

Flammable liquids, n.o.s., Class III, ID UN1993, PG II
Flammable liquids, corrosive, n.o.s., Class III, ID UN 2924, PG II
Flammable solid, organic, n.o.s., Class 4.1, ID UN1325, PG II

As required by 49 CFR 172.203 (k), the technical names of compounds that were in service included the following;

1.) 1-hexene polyethylene with ethane
2.) C16-C20 alpha olefins
3.) Therminol® VP1 Heat Transfer Fluid
4.) Dowtherm®A Heat Transfer Fluid
5.) C14 alpha olefin sulfonate
6.) Methylene chloride
7.) Pasadena gas oil
8.) Sodium aluminate solution
9.) Ethylene
10.) Alcohol/Olefin Mixture

Material Safety Data Sheets for each of these compounds is included with this application.

13. Provide a description of each package, and include a specification or exemption number, as applicable, to be used in conjunction with the requested exemption.

BP is applying for an exemption to transport the heat exchangers identified in the attached spreadsheet (**Figure 1**) that provides a physical description, operating parameters, chemical service, and nomenclature of each heat exchanger. The equipment number attached to each exchanger should be used as the specification number in referring to a specific piece of equipment.

14. For alternative packagings, the applicant must provide documentation of quality assurance controls, package design, manufacture, performance test criteria, in-service performance and service-life limitation.

Documentation of the year of hydrostatic test, service description, package design information, operating pressures and other pertinent information is presented in Table 1, Exchanger Summary.

15. The application must demonstrate that an exemption achieves a level of safety at least equal to that required by regulation, or if a required safety level does not exist, is consistent with the public interest. At a minimum the application must provide the following:
a. Information describing all relevant shipping and incident experience of which the applicant is aware that relates to the application.

The applicant (BP) is aware of the relevant shipping and incident experience for this exemption after making a detailed review of a previously granted exemption, DOT-E 12855 (Fifth Revision) expiring November 30 2005 granted to KRATON Polymers U.S. LLC of Belpre, OH.

Using the 12855 exemption as a guide, BP proposes the following Safety Control Measures and Operational Controls:

Safety Control Measures
A.) Packaging – Prescribed packaging are:

1.) Non-DOT "U" stamped pressure vessels (stainless steel) heat exchangers that are constructed in accordance with Section VIII Division I of the ASME Code, will have been successfully hydrostatically tested to no less than 50 psig. (The year of the hydrostatic test for each piece of equipment is present in Figure 1.)
2.) Non-DOT "U" stamped pressure vessels (carbon steel) heat exchangers that are constructed in accordance with Section VIII Division I of the ASME Code, will have been successfully hydrostatically tested to no less than 50 psig. (The year of the hydrostatic test for each piece of equipment is present in Figure 1.)
3.) Non-DOT "U" stamped pressure vessels (brass and copper-nickle) heat exchangers that are constructed in accordance with Section VIII Division I of the ASME Code, will have been successfully hydrostatically tested to no less than 50 psig. (The year of the hydrostatic test for each piece of equipment is present in Figure 1.)

Operational Controls

1.) Heat exchangers tubes/equipment that have internal spaces that may contain trapped residual materials will be purged with hydrocarbon and decontaminated to industry standards with water or steam before shipment according to Pasadena Chemicals internal safety policy # 5.2 (HazCom). This includes all hazardous and product service classes. All heat exchangers will be capped prior to shipment.
(Note: Since there is negligible opportunity for hazardous liquids to remain in the heat exchangers after BP's rigorous cleaning routine, we do not feel that shipping the exchangers under a positive nitrogen atmosphere adds to their safety during

transportation.)

2.) The Maintenance Foreman/Coordinator will ensure that each piece of equipment has a Hazardous Service Warning Tag attached. The Maintenance Foreman/Coordinator will consult with the appropriate Operations Foreman as necessary to determine the hazardous material(s) most recently contained by the equipment or part. This information will be included on the Hazardous Service Warning Tag.
3.) The Maintenance/Operations Foreman shall ensure that an MSDS for the material(s), as indicated on the Hazardous Service Warning tag, is forwarded with the shipping papers to the outside service company.
4.) Each heat exchanger will be transported via the specialized trucks owned and operated by Dunn Heat Exchangers of Texas City, Texas, the destination facility.
5.) Each pressure vessel must be secured to the motor vehicle in accordance with the requirements of §§393.100 through 393.106.

In addition to the Safety Control Measures and Operational Controls proposed above, BP will adhere to the provisions listed in the KRATON exemption as §8 through 12. In particular, BP will adhere to the provisions noted in §11 (Compliance) where DOT training is required for "HAZMAT employees". The motor vehicle operators employed by Dunn Heat Exchangers are subject to DOT training. The training taken by these operators, who will be responsible for loading, transportation, and unloading of the exchangers, is included with this application.

15b. A statement identifying any increased risk to safety or property that may result if the exemption is granted and a description of the measures to be taken to address that risk.

The applicant (BP) has not identified any increased risk to safety or property should this exemption be granted. The fact that the heat exchangers are thoroughly cleaned and will be transported by DOT-trained drivers experienced in the transportation of this equipment, serves to mitigate the very minimal risk that might be associated with this activity.

15c. Either substantiation, with applicable analyses, data or test results, that the proposed alternative will achieve a level of safety that is at least equal to that required by the regulation from which the exemption is sought; ***or***

See section 15d.

15d. If the regulations do not establish a level of safety, an analysis that identifies each hazard, potential failure mode and the probability of its occurrence, and how the risks associated with each hazard and failure mode are controlled for the duration of an activity or life-cycle of a packaging.

BP considers the regulations pertinent to the shipment of heat exchangers to be sufficient to establish a level of safety that is protective of human health and the environment. Due to the attention paid to cleaning of the exchangers prior to shipment and the experience and training of the drivers transporting this equipment, BP believes that the heat exchangers can be transported safely.

Perhaps the most severe failure mode would involve a motor vehicle accident where the heat exchanger was damaged. The probability of this occurrence is very low given the fact that commercial motor vehicle operators have accident rates on the order of 2.6 accidents per million miles driven (1994 data in September 1999 DOT TechBrief).

However, the slight risk of this occurrence is mitigated by the fact that the exchangers are thoroughly cleaned prior to shipment, that the drivers are DOT-trained and specialize in transporting this type of equipment, and that a motor vehicle accident would likely not damage the heat exchanger.